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ABSTRACTS OF CURRENT LITERATURE

SURGERY OF THE HEAD AND NECK

EYE

Callahan, A.: Eye Injuries at an Aircraft Plant. *J. M. Ass. Georgia*, 1944, 33: 312.

A series of 404 eye injuries, observed between January, 1942 and October, 1943, is presented, with an evaluation of some of the clinical and therapeutic problems encountered in industrial ophthalmologic practice at an aircraft plant.

In most instances the traumatic agents in these cases were particles of concrete or similar material, or of various types of metals, aluminum and light alloys in particular, used in the construction of airplanes.

Early recognition and treatment are imperative in all ocular injuries because the tendency of many reparative processes in the eye is toward the formation of nontransparent tissue. In this series, when the injury did not respond to adequate local therapy, syphilis was suspected and found responsible in a great number of cases. The average man-hour loss resulting from eye injuries was appreciably decreased when pre-employment examination and serologic tests were used to rule out those individuals with physical defects and systemic diseases such as syphilis.

A technique was devised by which the patient's head was fixed firmly against the chin-rest and forehead bar of the slit-lamp microscope. Analgesia was produced by ½ per cent pantocaine. Dissection and removal of all embedded particles with various spuds were done under direct observation with the (20×-40×) microscope.

Scant attention has been paid heretofore to a chemical sensitivity of the eye structure to aluminum compounds. However, most of the cases listed under traumatic and chemical conjunctivitis were those in which small particles of this metal were adhering to the surface of the conjunctiva.

Only 3 eyes were totally lost in the entire series of cases.

Two case reports of intraocular foreign bodies are given in detail, with illustrations concerning their extraction. LESLIE L. MCCOY, M.D.

Marshall, J. C.: A Case of Polycythemia Vera Extraction of Both Lenses with a Satisfactory Result. *Brit. J. Ophth.*, 1944, 28: 481.

The case of a seventy-four-year-old man with cataracts and a diagnosis of polycythemia vera, in which the lenses were successfully extracted, is reported in detail. A previous examination had shown the presence of retinal hemorrhages in the left eye, but in spite of this, vision of 6/6 was obtained in each eye with correction after surgery.

The author concludes that it is justifiable to carry out surgery in cases of polycythemia vera if it is required. Even in severe cases the retinal lesions may return to normal or leave minimal damage. Fundus examination in some cases may cause confusion with cerebral tumors because of the edema of the optic discs. WILLIAM A. MANN, M.D.

Asbury, M. K.: Epithelial Tumors of the Iris. *Am. J. Ophth.*, 1944, 27: 1094.

Four epithelial tumors of the iris are described in detail, including 2 previously reported in the literature. The author describes these as "a group of relatively benign epithelial tumors which affected principally the iris and arose presumably from the posterior iris epithelium or the anterior edge of the ciliary epithelium." They were circumscribed but not encapsulated, with a wide variation in pigmentation. In spite of the benign histological characteristics, there was a definite tendency toward local invasion and destruction. They might be classified as medulloepitheliomas or perhaps as a group between truly benign epithelial hyperplasia and malignant epithelioma.

WILLIAM A. MANN, M.D.

EAR

Matthews, R. M. S.: Obstruction of the Eustachian Tube and Barotrauma in Air Crews. *Brit. M. J.*, 1944, 2: 523.

Obstruction of the eustachian tube and otitic barotrauma present one of the greatest problems of the medical officer on a flying station. The term

"eustachian obstruction" is used to represent all degrees of impaired patency up to complete block, while otitic barotrauma refers to those cases presenting persistent abnormal drum appearances and hearing changes. The anatomic arrangement of the tubes is such that on ascent the relative increase of pressure in the middle ear is relieved spontaneously at definite intervals. On descent, however, spontaneous equalization of pressure does not occur and voluntary effort is necessary to allow air to enter the collapsible pharyngeal opening. This is done by swallowing, and sometimes by manipulating the mandible, by wide chewing movements, or by autoinflation. Eustachian obstruction causes a sensation of blocking of the ears, and the drum may be slightly invaginated in appearance. If the man has discovered his condition through flying, there may be barotraumatic changes as well. On attempting autoinflation no movement is observed and no subsequent click is heard. The determination of whether the tubes are patent may be a problem since, normally, movement of the drum is not always visible on autoinflation nor is there always an audible click. The presence of a cold does not always cause tubal obstruction, and mild forms of chronic rhinitis, pharyngitis, and tracheitis do not necessarily curtail flying duties. Otitic barotrauma is indicated at first by a sensation of fullness, then increasing deafness, and lastly pain. In slight cases the drums appear invaginated and injected, with slight impairment of hearing. In moderate cases hemorrhagic areas appear in the drum and in these recovery takes longer. In severe cases an effusion may occur into the middle ear, and in rare cases there may be rupture of the drum.

Prevention is of greatest importance. The time spent by the medical officer in instruction of the flying personnel is well repaid.

The treatment used for eustachian obstruction consists in the instillation of 3 drops of ¾ per cent ephedrine in liquid paraffin in each side of the nose while the patient is in the horizontal position with the head dorsiflexed on the neck until the tip of the chin and the ear are in the same vertical plane. After three minutes autoinflation is attempted. There have been no cases of spread of infection to the middle ear. Inhalations of menthol and eucalyptol in hot water are used afterward. If relief is obtained the man is limited to nonoperational duty for one night. If the tubes are still not patent after treatment the patient is confined to ground duties. The average time for recovery to fitness for full flying is two and five-tenths days. Benzidrene and karsodrine inhalers are convenient for air crews and are used before and after descent. Otitic barotrauma is most satisfactorily relieved by immediate ascent to a height above that at which barotrauma began, and subsequent slow descent with frequent autoinflation. On landing, treatment is necessary at the earliest opportunity, the first essential being to obtain patency of the tubes. If the use of a vasoconstrictor and Valsalva's method is unsuccessful, politzerization is used. Catheterization is seldom needed. The effects of the trauma must be resolved before flying is resumed. In the cases referred to, this required an average of twenty and four-tenths days.

JOHN R. LINDSAY, M.D.

Ullmann, E. V.: Traumatic Deafness in Combat Flyers. *Arch. Otolar.*, Chic., 1944, 40: 374.

A total number of 999 officers and 1,855 enlisted flying personnel were examined after combat duty. Of this series, 100 officers and 40 enlisted men were given special examination of the acoustic mechanism. These men were between the ages of twenty and thirty years. There was no complaint about their ears on questioning except an occasional humming and ringing in one or both ears. There was no trauma to the drums. Of this series, only 3 officers showed no damage to the acoustic mechanism, while 97 showed definite changes. Three per cent showed a loss of 100 decibels in one or more frequencies; 27 per cent showed a loss of 50 decibels in one or more frequencies, and 12 per cent a loss of from 10 to 25 decibels in one or more frequencies. In 6 cases the damage was traced to the middle ear.

Sixty six per cent of the officers showed a fatigue notch at frequency 2,896; 16 per cent at 4,096; and the remaining 18 per cent had mixed forms of hearing loss in which the original fatigue notch could no longer be distinguished. The time which had elapsed between the last flight and the audiogram was from ten to six weeks.

JOHN F. DELPH, M.D.

Swanson, C. A., and Baker, D. C., Jr.: The Use of Penicillin in Diseases of the Ear. *J. Am. M. Ass.*, 1944, 126: 616.

The Penicillin Committee at the National Naval Medical Center believes that the intramuscular administration of the drug is the most practicable. In order to insure the therapeutic effectiveness of the drug, this Committee stresses the importance of two conditions:

1. The maintainance of adequate nutrition and a positive nitrogen balance in patients who are receiving the drug.

2. Accurate preliminary bacteriologic studies to determine that the pathogen is an organism susceptible to the drug.

Infectious diseases of the ear can be effectively treated with penicillin because the anatomic structure of the ear permits the local administration of the drug and because the organisms causing most acute infections of the ear are usually in the group believed to be susceptible to the drug. Fowler made a study of 452 consecutive cases of acute otitis media. If his statistical analysis of the causative organisms in that series is correct, then 90 per cent of the organisms are susceptible to penicillin.

In this study, the sodium salt was used. It was given by continuous intravenous injection, intramuscular injection, or local instillation. In 1 instance a combination of the intramuscular and local routes was used.

The author summarizes his article as follows:

In acute otitis media penicillin is administered by intramuscular injection. The amount of drug necessary depends on the causative organism and the severity. Staphylococcic infections usually require a greater amount than those due to streptococci. The drug should be continued after the patient seems well to avoid possible relapse.

When surgical intervention is done in acute mastoiditis it can be supplemented by penicillin administered either intramuscularly or by local instillation into the mastoid cavity. In 1 case, penicillin seemed to shorten convalescence and hasten recovery from facial paralysis.

In acute labyrinthitis penicillin can be administered by the continuous intravenous injection method.

Special cases of chronic otitis media can be treated successfully by the local instillation of penicillin into the middle ear. The patients best suited to this therapy are patients with chronic discharging ears caused by organisms susceptible to penicillin, and with large perforations of the drum with no evidence of granulations or cholesteatomas. The pneumatic otoscope is good to force the drug into the middle ear, and the penicillin can be sealed in by means of cotton impregnated with a bland ointment.

LESLIE L. MCCOY, M.D.

Kelemen, G.: Fractures of the Temporal Bone. *Arch. Otolar.*, Chic., 1944, 40: 333.

The author presents a collection of 80 photomicrographs covering a series of 18 deaths due to skull fracture involving the temporal bone. These deaths occurred from trauma induced by moving vehicles and falls from high places.

For comparison, photomicrographs taken in cases of craniotomy for delivery are included. The pictures, dealing exclusively with human material, demonstrate the variations of temporal fractures with their effects on the different component tissues of the external, middle, and internal ear.

After the usual fixation, decalcification, and embedding, the sections were cut chiefly in the horizontal plane, with the exception of a small group which were cut vertically. All were stained with hematoxylin-eosin. JOHN F. DELPH, M.D.

NOSE AND SINUSES

Butler, D. B., Greenwood, G. J., and Ivy, A. C.: Reduced Atmospheric Pressure as a Form of Treatment for Paranasal Sinusitis. *Arch. Otolar.*, Chic., 1944, 40: 266.

The authors state that of 125 patients who were treated for chronic sinus disease in a high-altitude chamber by rapid decompression of the atmospheric pressure to 522.6 mm. of mercury, 89.5 per cent experienced subjective improvement at the conclusion of their course of treatment.

Of 29 patients who were followed up by serial roentgen studies after the instillation of radiopaque oils, 17 (58.6 per cent) showed improvement in the roentgenogram after the decompression treatments.

Of 42 patients who were studied by repeated rhinologic examination, 30 (71.4 per cent) showed improvement in their sinus condition after being treated by decompression.

A total of 2,259 treatments were given. The average number per patient was 18.1.

Decompression therapy is a simple nontraumatic form of treatment for subacute and chronic sinus disease. JAMES C. BRASWELL, M.D.

Putney, F. J.: Uses of Penicillin in Diseases of the Nose and Throat. *J. Am. M. Ass.*, 1944, 126: 620.

The author presents 9 cases of sinus diseases in which penicillin was administered because life was endangered. It was found that acute conditions responded better than chronic ones. In chronic cases the infection often became active after treatment was terminated. Failure to respond to penicillin is attributed to resistance of the organism to the drug. The author believes that if the condition shows no improvement and the purulent drainage continues after three or four days of penicillin therapy, sensitivity tests should be performed. Osteomyelitis still requires surgical intervention, which is best performed during the period in which the infection has been checked by penicillin. This drug is effective against sulfonamide-resistant organisms, and cases which had had sulfonamide therapy were as much improved by penicillin as those which had not been treated with sulfonamides. There were no toxic reactions systemically or locally. Penicillin was used in 6 cases of osteomyelitis (of the frontal bone in 5 cases and of the frontal and maxillary bones in 1 case), and in 3 cases of orbital cellulitis secondary to sinusitis. In chronic osteomyelitis, penicillin therapy for several months may prevent the need for extensive surgery. Brain abscess, extradural abscess, and orbital cellulitis occurred in 3 cases of osteomyelitis without any relation to the response to the drug.

In addition to the local use of penicillin, 24,000 units were given intramuscularly every three hours, followed by 15,000 units every three hours when the condition improved.

Prompt healing occurred, but the underlying sinusitis was unaffected in 3 cases of orbital cellulitis; sinus surgery was necessary in 2 cases. These patients had been given sulfonamide therapy previously without improvement.

In 1 case of cavernous-sinus thrombosis, death occurred on the eleventh day of therapy; 400,000 units of penicillin had been given in the first two days by continuous intravenous drip, and this was followed by 25,000 units given intramuscularly every three hours thereafter.

Acute infections of the maxillary sinuses have been cured after several irrigations with a solution of 250 units of penicillin per cubic centimeter. In Vincent's infection of the mouth and of the tonsils, the

organisms disappear after a few days of systemic penicillin therapy.

In discussing this article, VORISEK recommended a solution of 500 units per cubic centimeter, for gonorrheal ophthalmia, 4 drops of this solution to be instilled every hour. Smears and cultures from the conjunctiva became negative after twenty-four hours and there were no recurrences. The penicillin should be continued until at least three consecutive daily examinations are negative.

Penicillin has also been used for irrigation of the lacrimal passages in cases of chronic suppurative dacryocystitis; 2 cc. of the 500-unit solution are given daily. After the second irrigation the secretion usually becomes negligible, and after several days it becomes clear.

KOEBBE obtained good results in early acute otitis media with 15,000 units of penicillin every three hours around-the-clock for seven days until the drum resolved and the landmarks returned, then 10,000 units for three or four days, and 5,000 units for three or four days more. HENNER used heparin in conjunction with penicillin in cavernous-sinus thrombosis. PUTNEY emphasized the importance of surgery in lateral-sinus thrombosis in conjunction with penicillin therapy. JOSHUA ZUCKERMAN, M.D.

Havens, F. Z., and Thornell, W. C.: Malignant Tumors of the Nasal Cavity; Report of 8 Cases in Which a Frontoethmoid Approach was Employed. *Arch. Otolar.*, Chic., 1944, 40: 396.

Many methods of approach to the nasal cavity and paranasal sinuses have been devised for removal of benign and malignant tumors and for treatment of suppurative disease of the paranasal sinuses. The authors review various procedures that have been used since 1893, and describe a method of approach they have used with satisfaction in certain selected cases in which malignant disease was present but in which there was little or no roentgenological evidence of involvement of bone. They report 8 cases.

Carcinoma within the nasal cavity is most likely to be found on the septum or high on the lateral wall of the nasal passage. Recent nasal obstruction and increased nasal discharge or purulent discharge with bleeding should suggest the possibility of malignant disease. Although nasal obstruction often is attributed to polyps, recent nasal obstruction, particularly when the patient is more than forty years of age, is not likely to be due to polyps. Far too frequently such so-called "polyps" have been removed repeatedly, without a suspicion of carcinoma and without pathological examination of the removed tissue. Such mismanagement allows carcinoma to advance until removal is impossible. If a mass in the nose bleeds readily on slight trauma or if its removal is followed by free bleeding, a malignant lesion should be suspected until some cause other than carcinoma has been found.

A carcinomatous mass which may not be primary in the nose may be found in a nasal passage. It may be an extension from the maxillary sinus or from the ethmoid cells. Such a mass in the nose, whether or not it is primary, often is ulcerated and infected. This probably is due to trauma from crusting, and perhaps is aggravated by the patient's efforts to clear the nostril. If a specimen is obtained for biopsy, the instrument may remove only inflamed semi-necrotic portions of the tumor. Correct diagnosis on examination of such tissue is difficult or impossible. A negative report, therefore, must not be accepted with complete assurance until it is certain that a representative specimen has been examined by the pathologist.

Roentgenograms of the paranasal sinuses are essential in cases of tumor. In a number of the authors' cases the sinuses appeared cloudy on the side on which the lesion was situated, and clear or comparatively clear on the opposite side. This finding suggests obstruction due to neoplasm rather than an inflammatory process. Erosion of bone indicates extension of the malignancy beyond the nasal mucosa.

The final diagnosis rests on biopsy. Determination of the degree of malignancy by grading according to the method of Broders is of great aid in deciding on the best plan of treatment.

Treatment of malignant disease within the nasal cavity when the roentgenogram reveals little or no evidence of involvement of bone requires adequate exposure (1) to ascertain the extent of the tumor and to find its point of attachment, (2) to permit proper control of hemorrhage and (3) to permit removal of the tumor and, if necessary, accurate implantation of radium. In some of the authors' cases, the tumor, although large, was attached by a narrow pedicle. Without adequate exposure it would have been impossible either to ascertain this or to carry out accurate removal.

The incision is started just under the unshaven eyebrow, 1 cm. lateral to its inner extremity. It is extended medially and then downward midway between the inner canthus of the eye and the middle of the dorsum of the nose, then down the nasofacial sulcus to end just below the free edge of the nasal bones. The incision is carried through the soft tissues and periosteum and down to the bone. Continuous suction throughout the operation is employed, and bleeding points are ligated or coagulated with the electrosurgical unit. By means of a sharp periosteum elevator, the periosteum is elevated from the bone medially as far as the middle of the nose and laterally as far as the lacrimal bone, care being exercised to avoid damage to the lacrimal sac. Elevation of the lacrimal sac from its fossa and of the periosteum from the lamina papyraceas may be required if extension of the tumor into the ethmoid cells makes it necessary to explore the whole ethmoid region. An incision is made through the nasal mucous membrane along the lower free edge of the nasal bone and the mucous membrane is freed from the undersurface of this bone. Access to the nasal cavity is then gained by using a rongeur to remove portions of the nasal bone and of the nasal process of the maxillary and frontal bones, after which

an incision is made through the nasal mucous membrane parallel to the skin incision, to expose the interior of the nasal cavity. The point of attachment and extent of the tumor then are determined. If the attachment is mainly in the ethmoid region, it becomes necessary to expose the ethmoid cells by removal of the lacrimal bone and a portion of the lamina papyracea of the ethmoid bone. If the attachment is in the region of the maxillary ostium, it usually is advisable to open the maxillary sinus, as is done in the Caldwell-Luc operation, and to examine this sinus carefully for extension of the tumor. Examination of the frontal or sphenoid sinuses may be necessary. After removal of the tumor, the point of attachment is thoroughly electrocoagulated and radium is applied over the coagulated region. The radium is held in place with gauze packing so arranged that both the radium and packing can be removed through the nostril. The wound is then closed with subcutaneous interrupted catgut sutures, and the skin edges are approximated with black silk. A pressure dressing is then applied. The sutures are removed in three or four days. The scar usually is quite inconspicuous.

MOUTH

Figi, F. A., and Rowland, W. D.: Primary Tumors of Stensen's and Wharton's Ducts. *Arch. Otolar.*, Chic., 1944, 40: 175.

A tumor arising in Stensen's or in Wharton's duct is rare, but 2 cases of adenocarcinoma of the main salivary ducts have come under the observation of Figi and Rowland in recent years; and, in addition, 2 inflammatory nodules occurring without salivary calculi have been encountered in these structures.

The symptoms complained of in the cases of true neoplasm were not uniform. In one case they were those characteristic of recurring obstruction of Stensen's duct, and in the other (the case of adenocarcinoma of Wharton's duct) the patient had noted two small, tender nodules in the right side of the floor of the mouth situated anteriorly along the course of the submaxillary salivary duct. These had increased steadily in size but had not produced evidence of obstruction to the flow of saliva.

The tumors were firm, movable, slow-growing nodules, and each appeared to be encapsulated within the wall of the duct, so that they were relatively easy to remove. They were excised, the duct being amputated, and in one of the cases the proximal stump of the duct was inserted into a stab wound in the cheek posterior to the site of the original orifice. Interstitial radium therapy was given to the operative wounds.

The two distinct nodules present in the submaxillary salivary duct in the second case proved to be malignant. NOAH D. FABRICANT, M.D.

Burger, R. E., and Lehman, E. P.: Leontiasis Ossea Complicated by Marjolin's Ulcer. *Surgery*, 1944, 16: 542.

The author states that this case of leontiasis ossea, originating in youth, seems to belong to Group I of Monti's classification. Although it adds nothing to our knowledge of the etiology of the disease, it presents several aspects of interest.

In the first place, the spontaneous sloughing of the dense maxillary lesions with apparent local cure is unusual. This was presumably the result of infection similar to the process in the mandible for which the patient was first treated at this hospital. The

Fig. 1.

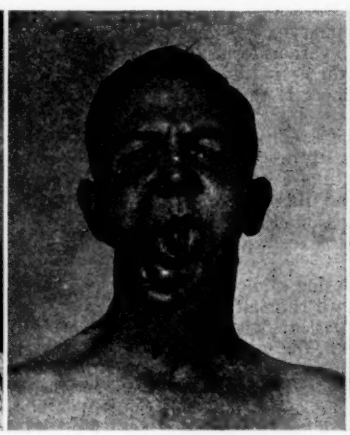

Fig. 2.

Fig. 3.

Fig. 1. Photograph of the patient in 1930, revealing the large lower jaw.

Figs. 2 and 3. Photographs taken November, 1942, showing the regression in the visible epidermoid carcinoma and them arked increase of puckering of the flap, possibly due to infiltrating tumor.

arrest of the disease in this area may have protected him from the effects of craniostenosis. It raises the question as to whether radical excision of the diseased areas in an early stage might modify the gradual spread of the lesion. Coppo is stated to have reported a case of resection of the right superior maxilla for leontiasis ossea.

The present case is also interesting on account of the enormous size of the jaw lesion, which in itself caused complete disability. One of the earlier cases shows a tumor of the jaw comparable to the present example. In the third place, the case illustrates the spread of the process into the upper cervical vertebrae, a phenomenon reported previously. The limitation of the process to that portion of a bone arising in a simple anlage as described by Mayer is illustrated by the escape of the intermaxillary process although the superior maxilla on each side was involved to a marked degree.

Finally, the complicating epidermoid carcinoma which determined the outcome of the case is unique. This neoplasm is unquestionably of the same nature as Marjolin's ulcer occurring in chronic ulcer of the skin and in chronic sinuses. The incidence of epidermoid carcinoma in a buccal fistula has not been made the object of a search of the literature, but it must be very rare. JAMES C. BRASWELL, M.D.

PHARYNX

Szanto, P. B., and Hollender, A. R.: Tuberculosis of the Nasopharynx. *Ann. Otol. Rhinol.*, 1944, 53: 508.

Tuberculosis of the nasopharynx has been a neglected medical problem. As a complication of pulmonary tuberculosis its incidence is greater than that of tuberculosis of the larynx.

Among 134 consecutive autopsies in which a general pathological study of the nasopharynx was performed, there were 24 subjects with various forms of pulmonary tuberculosis, and, of these, 18 (75 per cent) showed tuberculous involvement of the nasopharynx.

Histopathological study is often essential for a positive diagnosis of nasopharyngeal tuberculosis.

The nasopharynx may be the site of a persistent focus of tuberculous infection, and this may frequently explain the source of reinfection of the lungs in persons who have previously experienced an arrest of pulmonary involvement.

A plea is made for careful, routine clinical investigation of the nasopharynx in all rhinolaryngological examinations, especially in patients with pulmonary tuberculous disease. JOHN F. DELPH, M.D.

NECK

Shirer, J. W.: Modification of the King Operation for Bilateral Paralysis of the Vocal Cord. *Ann. Surg.*, 1944, 120: 617.

Shirer states that his modification of the King operation is simple and provides a sufficient and adequate airway for removal of the permanent tracheotomy tube. JAMES C. BRASWELL, M.D.

Clerf, L. H.: The Pre-epiglottic Space: Its Relation to Carcinoma of the Epiglottis. *Arch. Otolar.*, Chic., 1944, 40: 177.

The pre-epiglottic space is described by anatomists as triangular, or funnel-shaped in sagittal section, with the base directed upward. It is an actual space, filled with cellular and adipose tissue; it contains no lymph nodes but is traversed by lymphatic vessels. The anterior and anterolateral walls are formed by the upper portions of the wings of the thyroid cartilage and thyrohyoid membrane. This membrane is strengthened by elastic fibers in the midline and at all the tips of the greater cornua of the hyoid bone, forming the median and lateral thyrohyoid ligaments. It is pierced on each side of the midline by the superior laryngeal vessels and the internal division of the superior laryngeal nerve, and it also transmits a few efferent lymphatic vessels. The base is closed by the hypoepiglottic aponeurosis or ligament which extends from the upper margin of the body of the hyoid bone to the anterior surface of approximately the middle of the epiglottis and corresponds to the bottom of the vallecula. The posterior boundary is formed by the epiglottis extending from the hyoepiglottic aponeurosis above to the thyroepiglottic ligament, which is situated immediately above the anterior commissure. Since the lower part of the epiglottis becomes narrowed, the remainder of the posterior boundary of the pre-epiglottic space is formed by an elastic membrane. This can, therefore, be considered as the weak wall of the pre-epiglottic space, as the epiglottis itself affords little protection against cancerous invasion, consisting as it does of thin yellow elastic cartilage

Fig. 1. A, Sagittal section of the larynx showing the pre-epiglottic space and its boundaries. The thyrohyoid membrane and the thyroid cartilage are anterior. The hypoepiglottic aponeurosis above forms the base and the epiglottis and the thyroepiglottic ligament are posterior. B, Schematic drawing to show the defective or weak posterior wall of the pre-epiglottic space, which is formed by the epiglottis from the level of the hypoepiglottic aponeurosis (a) above to the thyroepiglottic ligament below. The lateral margins are closed by elastic membrane.

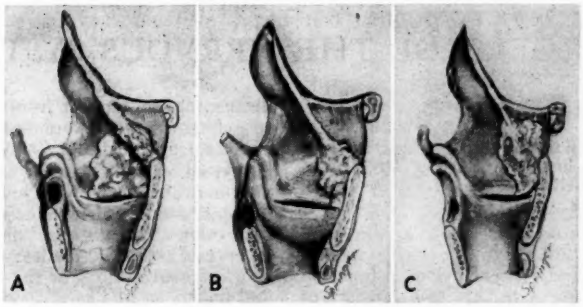

Fig. 2. A, Extensive cancer of the vestibule which extended a considerable distance along the left ventricular band, crossed the anterior commissure and involved the anterior end of the right ventricular band. The lower two-thirds of the posterior surface of the epiglottis also was involved. Invasion of the pre-epilottic space was widespread but had not penetrated deeply. B, Cancer of the vestibule of the larynx which involved the extreme anterior ends of both ventricular bands. There were no disturbances of the voice. Although the epiglottic involvement was extensive, it could not be visualized by mirror laryngoscopy because of an overhanging epiglottis. Invasion of the pre-epiglottic space extended to the median thyrohyoid ligament. C, Extensive invasion of the pre-epiglottic space by a vestibular cancer which exhibited a relatively small surface lesion. Because of the close proximity of the invading mass to the hyoepiglottic aponeurosis, incision across the pre-epiglottic space would have resulted in incomplete removal of the cancer.

which exhibits many depressions, even perforation, and rarely undergoes ossification.

The anterior invasion of the pre-epiglottic space is important, for it cannot be determined by mirror laryngoscopy or by direct examination. While much information can be secured with lateral roentgenograms of the larynx, these commonly exhibit only the more dense portions of the cancer. It is common to find cancer cells by microscopic examinations of the pre-epiglottic space well beyond the apparent anatomic margins of the growth. The thyrohyoid membrane and the hyoepiglottic aponeurosis offer marked resistance to neoplastic invasion, so that in cases of pre-epiglottic invasion, involvement of the base of the tongue or penetration of the thyrohyoid membrane to the front of the neck is rare. There commonly is metastasis to the regional lymph nodes long before this occurs.

The lymphatic drainage from the base of the epiglottis and the anterior extremities of the ventricular bands is carried across the pre-epiglottic space through the thyrohyoid membrane to the upper nodes of the deep cervical group. Occasionally one or more vessels pass upward and terminate in a node situated below the posterior belly of the digastric muscle, but metastasis to this is uncommon. In 2 recent cases of carcinoma of the base of the epiglottis, Clerf discovered small nodes immediately above the hyoid bone on the mylohyoid muscle. These apparently were submental nodes which, usually arranged in transverse direction, occasionally may be placed vertically and then one is in close relation to the hyoid bone. In these 2 cases the position of the submental nodes apparently conformed to the latter arrangement. In neither of these was there any histological evidence of carcinoma. Since carcinoma of the anterior portion of the larynx above the vocal cords invariably perforates the epiglottis and commonly invades the pre-epiglottic space before it is recognized clinically, it is necessary to deal surgically with this space. Invasion through the hyoepiglottic aponeurosis is rarely observed; therefore a surgical approach which does not enter the pre-epiglottic space should be employed. If one removes the hyoid bone with the larynx by incision through the muscles above it and keeps the operation above the hyoepiglottic aponeurosis, the incision always is through normal tissue. Laryngectomy with extirpation of the pre-epiglottic space, or pre-epiglotto laryngectomy, would seem to be the rational surgical procedure to practice in all these cases.

J. M. Mora, M.D.

SURGERY OF THE NERVOUS SYSTEM

PERIPHERAL NERVES

Harvey, A. M., and Kuffler, S. W.: Motor-Nerve Function with Lesions of the Peripheral Nerves: A Quantitative Study. *Arch. Neur. Psychiat.*, Chic., 1944, 52: 317.

A simple test has been devised to determine the localization and extent of nerve injuries, as well as to estimate quantitatively the recovery of function or the effect of treatment. This test consists of recording by means of electrodes—similar to the recording of encephalographic findings. The electrodes are carefully applied over the muscles to be tested, and the leads are recorded through a connection with an electrocardiograph or an electroencephalograph. Nerve stimulation is produced at a higher level by breaking the current flow in the primary of an induction coil with a Morse key (or any suitable type of contact breaker). Two stimulating electrodes lead from the secondary coil to the patient, one "indifferent," which consists of a large copperizing plate in contact with the patient's extremity 10 or 20 cm. above the point along the nerve to be stimulated. The second stimulating electrode consists of a small, round metal disc attached to the end of a hardwood rod covered by gauze and lint. The arm must be held as quietly as possible during the recording. Stimulation of the nerve for consideration is accomplished at a suitable point where it is most accessible. The maximal motor-nerve stimulus is applied by the stimulating electrode, and the action potential is then recorded from the recording electrode leads to the recording device. A group of normal action potentials for various muscles, resulting from maximum motor-nerve stimulus, has been recorded. A comparison with these figures, more particularly, with those of the opposite sides of the body, allows one to estimate the degree of nerve function present.

This test has been advocated for differentiation between organic and hysterical paralysis, as well as for estimates of recovery following peripheral-nerve disease or injury. HOWARD A. BROWN, M.D.

Harvey, A. M.: A Type of Neuritis Associated with Malarial Fever. *Bull. Johns Hopkins Hosp.*, 1944, 75: 225.

A study of a group of malarial patients with various neurological manifestations or involvements of the nervous system is presented in this report by the author. The symptoms were very protean in character, and in the milder cases were largely subjective in nature.

The subjective sensory manifestations consisted of "numbness," "drawing" sensations in the muscles, and the feeling of an extremity "going to sleep." These were often bilateral and of very short duration, appearing after exercise or at night, awakening the patient from sleep. More severe or subsequent attacks were associated with detectable neurological signs, such as hyperalgesia, hypalgesia, or hypesthesia. The areas involved were varied—peripheral, radicular, or glove-type in distribution.

Signs of motor disturbances were noted during the subjective complaints of "drawing" sensations and comprised either involuntary fascicular movements or gross contractions of the flexors of the forearms and fingers as well as occasional involvement of the lower extremities. These manifestations, which persisted for several days to weeks, were always accompanied by hyperalgesia.

Sympathetic autonomic irritation was manifested by cold, blotchy cyanotic, hyperhidrotic areas in the site of the neural involvement. This occurred only in the more severely affected cases.

It is of interest that although the majority of these cases occurred during the first or second attack (including the period immediately following the attack), organic signs of neural involvement were more pronounced during subsequent attacks. The data given do not correlate the amount or period of medication; however, it is understood that all of the patients were under medication at the time that they developed their neurological signs.

The author endorses Anderson's pathological findings that a vascular basis is the cause of the damage to the nervous system since the symptoms are best accounted for by this explanation.

JACK WOOLF, M.D.

BRAIN AND ITS COVERINGS; CRANIAL NERVES

Ross, W. D., and McNaughton, F. L.: Head Injury; A Study of Patients with Chronic Post-traumatic Complaints. *Arch. Neur. Psychiat.*, Chic., 1944, 52: 255.

The cause of post-traumatic complaints or syndromes has passed through many phases of terminology and theorization. The authors present an evaluation derived from a careful study of 90 head-injury subjects by physiological, psychological, and neurosurgical means.

The severity of the injury was rated according to post-traumatic amnesia, the number of red cells in the spinal fluid, x-ray evidence of damage to the skull, and abnormal findings on neurological examination. Both the electroencephalographic and pneumoencephalographic studies, rated by Jasper and Childe, respectively, were found to show a slight correlation with the degree of injury. After a period of approximately two years the electroencephalographic abnormalities regressed, while the pneumoencephalographic abnormalities persisted.

The personality of each patient was carefully evaluated by planned psychiatric interviews.. Situa-

tional factors were tabulated according to type, and their relation with the injury. Various psychological tests were used. The Shipley-Hartford test showed no relation to the severity of injury. The Kraepelin continuous subtraction test and repetition of digits were of no definite help in this study. Striking results, however, were obtained by the Rorschach test in differentiating the psychogenic from the cerebral organic disturbances. Repeated testing revealed a continuous flux which varied with the improvement of the condition. By means of the Rorschach method and psychological or personality factors, the patients were classified and rated according to the degree of disability or instability revealed in each case.

Headaches have been one of the most common complaints of the patients after head injury; these were divided into several types. The localized and hemicranial variety were more frequently associated with organic disturbances, while the generalized and bizarre headaches were associated with psychological factors. Patients with localized headaches were found to be in better condition than those in other groups. The Rorschach test revealed a low instability and high disability rating which corresponded with evidence of organic disturbances in electroencephalographic and pneumoencephalographic tests. It was of interest to note that even this group of patients were influenced by personal situational factors.

A re-evaluation of the subdural and spinal insufflation treatments was suggested by Penfield, who first used these procedures. It was found, however, that the long-term results were no better than the results following pneumoencephalograms, "and that for none of these patients could the influence of other factors be ruled out. The results in a few patients treated by a direct operative procedure suggest a limited application of such measures in carefully selected cases." The use of prostigmine was also of no value. Its effect upon postural vascular responses was shown by slowing of the pulse rate, but there was no alteration of the headache.

The main concept carried throughout this study is that there is no specific syndrome following head injuries, and that in all, both organic and psychogenic factors, as well as their admixture, must be evaluated for the individual patient.

JACK WOOLF, M.D.

Marburg, O., and Casamajor, L.: Phlebostasis and Phlebothrombosis of the Brain in the Newborn and in Early Childhood. *Arch. Neur. Psychiat.*, Chic., 1944, 52: 170.

The basis of this report is a rather rare condition and a controversial one. It has to do with cyst formation and softening of the brain in children shortly after birth or before birth, and results in the clinical picture of amentia, spasticity, and, finally, death. The authors wish to show that the condition is primarily due to obstruction and thrombosis in certain of the venous areas of the brain, and that this condition results from trauma before or during birth. There is a clinical discussion of some of the literature, especially the German literature, on this subject, and 2 illustrative cases of their own.

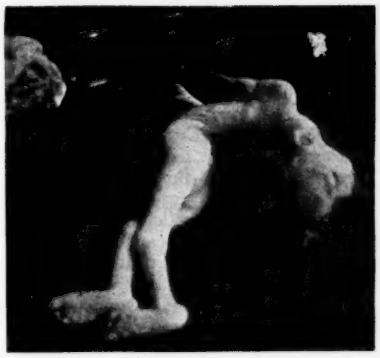

Fig. 1. Final state of the process.

The first case was that of a child seen when he was nine months old. He had been normally delivered, but from birth had not been active, had not eaten well, and had not taken any interest in his surroundings. At the age of four months convulsions had set in with opisthotonos. The child died at the age of nine months. The brain was then examined and it forms a basis for this discussion.

The second case was that of a child who reached the age of thirteen years before he died. He was normally delivered, but when he was two and one-half months old it was noted that he did not move his leg and that he had a curvature of the spine. He could not sit up nor hold up his head. Pneumonia developed when he was eighteen months old. This child was first seen in the Neurological Institute when he was about two years old. At that time he showed marked spasticity and primary optic atrophy. The condition became more and more marked until finally a stage was reached which is illustrated in the accompanying figures.

This child constitutes the second case on which the argument is based. The pathological changes in the brain were necrosis in the centrum semiovale of the brain with softening which was followed by total or partial destruction of the brain tissue and resultant cyst formation. The least resistant structures, that is, the myelin sheaths and the axons were first destroyed and the more resistant structures, the glia, were spared until very late in the condition. In the stages of complete destruction, cyst formation occurred and in incomplete destruction, sclerosis. The site of the lesions corresponded to the drainage area of certain veins, notably the vena cerebri magna of Galen and the area drained by the superior sagittal sinus.

The clinical picture was as follows:

The children were apparently normally delivered, but after a few weeks they showed signs of a disease

which ended in an excessive increase in muscular tone, opisthotonos, flexed arms, stretched legs, clenched fists, talipes equinovarus, and exaggerated reflexes. In the pathological studies of the complaint the authors were able to show evidence of venous obstruction by stasis and venous obstruction by thrombosis in the areas of drainage of the veins already described. They are quite unable, however, to be sure that infection did not play an important role. The condition is, apparently, analogous to swayback in lambs. The article has some very good illustrations and the argument is quite extensive, and, as was mentioned before, it introduces many similar cases from the literature.

ADRIEN VERBRUGGHEN, M.D.

Raaf, J., and Kernohan, J. W.: The Relation of Abnormal Collections of Cells in the Posterior Medullary Velum of the Cerebellum to the Origin of Medulloblastoma. *Arch. Neur. Psychiat.*, Chic., 1944, 52: 163.

The germinal bud from which the external granular layer of the cerebellum arises is situated at the posterior tip of the posterior medullary velum. It normally disappears before the end of the first month of extrauterine life. One hundred sixty-one fetal and infant cerebellums were studied, and abnormal collections of cells were found only in the region of the posterior medullary velum. Of 104 cerebellums in which the posterior medullary velum was examined microscopically, 23 were found to contain abnormal collections of cells. These cells were morphologically similar to the cells of medulloblastomas. In 8 of 25 cases of medulloblastoma the site of origin was found to be the posterior medullary velum; in the other 17 cases the site of origin could not definitely be established, but it also may have been the posterior medullary velum. Since the site of abnormal collections of cells and the site of origin of medulloblastomas were found in the region formerly occupied by the germinal bud, the authors think that medulloblastomas originate frequently, if not exclusively, from cell rests which occur in the region originally occupied by the germinal bud.

Meads, M., Harris, W., Samper, B. A., and Finland, M.: The Treatment of Meningococcal Meningitis with Penicillin. *N. England J. M.*, 1944, 231: 509.

Because of the good results obtained with sulfonamides, there have been few reports of cases of meningococcal infection treated with penicillin. The gonococcus has been studied, but the studies have been mostly confined to the treatment of sulfonamide-resistant gonorrhea, which almost invariably responds to penicillin in adequate doses.

This study concerns 9 cases of meningococcal meningitis admitted to the Boston City Hospital, Boston, Massachusetts, during April, 1944. The ages of the patients ranged between fourteen and fifty-eight years. Some patients were acutely ill and irrational, 1 was acutely ill and rational, and 1 was only moderately ill when first seen. The duration of the acute illness before entry ranged from one to seven days and averaged about three days. Sulfonamide determinations of the blood were made routinely on admission in order to ascertain whether previous therapy by these drugs had been undertaken. No sulfonamide was found except in the last case. Lumbar punctures were done on admission and at intervals of from twelve to twenty-four hours. Cell counts, smears and cultures of the sediment, and chemical studies of the cerebrospinal fluid were carried out routinely. Blood and throat cultures were made on admission and in some cases were repeated once or twice daily until they were negative. Cultures and smears of the spinal-fluid sediment were checked from time to time. With regard to treatment, all of the cases were started on penicillin, given both intramuscularly and intraspinally immediately after the diagnosis was made. The initial spinal dose consisted of from 10,000 to 20,000 units in 10 cc. of sterile physiological saline solution to replace a similar or larger volume of spinal fluid withdrawn.

From 5,000 to 15,000 units of penicillin were then given intraspinally at twelve-hour intervals for 2 or 5 doses, and every twenty-four hours after improvement was noted bacteriologically and clinically, and this dosage was continued until clinical and bacteriological recovery took place. Intramuscular therapy consisted of doses of 15,000 units every three hours in 7 cases, and of doses of 10,000 units every three hours in 2 cases. The total amount of penicillin given intrathecally varied from 30,000 to 150,000 units and averaged about 75,000 units. The amount of penicillin given intramuscularly ranged from 190,000 to 1,155,000 units, and averaged about 500,000 units. Very careful records were kept of the patients and there is a large table summarizing each case with dosage, bacteriological effects, and results. In 1 case a convulsion occurred eight hours after the first lumbar puncture with the introduction of penicillin. In 6 cases improvement was first observed in from one to five days after the treatment was started (the average was about three days). In 2 cases there was a clinical recurrence, 1 on the twelfth day and 1 on the fourth day; in these cases penicillin therapy was discontinued and sulfapyridine therapy was substituted for it. In the case in which sulfonamide had been given before admission, the patient responded rapidly after twenty-four hours of penicillin treatment. Six patients became afebrile in from five to fifteen days, the average being almost ten days. In 3 cases the response was faster. In the first of these 3, the patient was afebrile in three and one-half days; in the second, after twenty-four hours; and in the third, after fifty-two hours.

The conclusion was reached from the clinical and laboratory findings in these 9 cases of meningococcal meningitis treated with calcium penicillin, that sulfonamides are the drugs of choice in the treatment of group 1 meningococcus meningitis, and that penicillin may be effective in group 1 meningococcus

meningitis in the doses used, but the response is less favorable than that from sulfonamide therapy. Clinical response to penicillin is slower than that to the sulfonamides; abnormal spinal-fluid, chemical, and bacteriological findings persist longer; there may be recurrences, and, finally, sulfonamides may have to be resorted to to effect a cure. Calcium penicillin is very effective against group 1 meningococcus bacteriemia. ADRIEN VERBRUGGHEN, M.D.

MISCELLANEOUS

Smith, A. DeF., Deery, E. M., and Hagman, G. L.: Herniation of the Nucleus Pulposus. A Study of 100 Cases Treated by Operation. *J. Bone Surg.*, 1944, 26: 821.

This study is based on 100 consecutive patients with herniation of a nucleus pulposus who were operated upon at the New York Orthopaedic Dispensary and Hospital, New York, between January, 1937 and April, 1943. Low back pain to some degree was present in all but 1 patient. The results of the treatment are estimated in only 70 cases, because the remainder of the cases were operated on less than one year before this report. It is the opinion of the authors that in many cases of herniation of a disc there is a deranged or unstable lumbosacral joint. They consider this important from many points of view. They believe, first, that probably more fusions should be done than are being done, and, second, that the problem is one which concerns not only the orthopedic surgeon, but the neurological surgeon, and, third, that the best results will be obtained by co-operation between the two men.

Fusion was done by the Hibbs method in 83 cases. The indications for fusion were an unstable joint, as determined by the roentgenograms, with or without symptoms of back pain. The Hibbs method of fusion was employed because of the simplicity of combining it with interlamina removal of the herniated disc.

With regard to the symptoms and physical signs, there was a history of low back pain of varying duration in almost every case. The shortest history of sciatic pain was one month (2 cases) and the longest was ten years (4 cases); the others varied between these extremes. The sciatic pain was increased with coughing and sneezing in 55 cases, but the results were not always recorded. There was a decreased or obliterated lumbar lordosis in 61 per cent. Raising of the straight leg was limited in only 70 per cent of the patients. The ankle jerk was definitely diminished or entirely absent in 85 cases. It was believed that the sensory changes were by far the most accurate means of discovering the site at which the herniation was to be found, as neither the motor signs nor the narrowed intervertebral space, if there was one that could be seen on the roentgenograms, could be relied upon to indicate the exact level of the herniation.

Air studies, lipiodol studies, and other similar tests are no longer used. Criteria for determining an unstable or mechanically deranged lumbosacral joint, as seen in the roentgenograms, were numerous and included asymmetrical lateral articulations, anterior or posterior displacement of the fifth lumbar body, exaggeration of the lumbosacral angle, a thin intervertebral disc, and a transitional or partially sacralized lumbosacral vertebra. With regard to the operation, the usual technique was employed with the exception that the patient was placed in a kneeling position with the hips flexed at 90 degrees. This was considered to be an important point in the technique of the operative procedure, especially if a fusion was to be performed. The patient was allowed up in a Taylor brace at the end of six weeks, and normal activities were usually begun about five months after the operation. Among the 83 patients who had a spinal fusion, failure occurred in 8, or about 12 per cent. However, in 2 or 3 of these a good result was obtained by a secondary repair operation.

The results were classified as excellent, good, or poor. An excellent result was considered to have been obtained when the patient was able to return to the same occupation or one equivalent to that which he had before operation; a good result was considered to have taken place when only slight pain was felt and there was no disability. In the patients who had sufficient pain to cause partial or complete disability the result was described as poor. On this basis there were 24 excellent results, 33 good, and 13 poor. ADRIEN VERBRUGGHEN, M.D.

Woodhall, B.: Fibrin Foam as a Hemostatic Agent in Rehabilitation Neurosurgery. *J. Am. M. Ass.*, 1944, 126: 469.

Since the introduction of fibrin foam as a hemostatic agent by Ingraham and Bailey in 1944, this substance has been the subject of many examinations, and its use is now past the experimental stage. It was made available to the Neurosurgical Section of the Walter Reed General Hospital, Washington, D.C., in the fall of 1943, and since January, 1944 it has been used in a total number of 226 neurosurgical operations.

Hitherto, control of hemorrhage in neurosurgery was confined to the use of silver clips, the electrosurgical unit, hot cotton pledgets, and muscle clips. There are certain situations in which silver clips and the cautery cannot be used; hot moist surgical patties are often ineffectual and time-consuming; and muscle pledgets are by no means universally successful and often promote considerable tissue reaction. Fibrin foam, on the other hand, is useful in many situations and is a prompt hemostatic agent, is absorbable, and causes very little, if any, tissue reaction. It is prepared from human fibrinogen and human thrombin and is kept in a dry state in which it appears dull, white, and brittle. A fairly large mass of fibrin foam is packaged sterile in a dry state and with a vial of dried human thrombin. A third vial contains 30 cc. of sterile isotonic solution of sodium chloride. At the operating table the thrombin is dissolved in the saline solution by means of vigorous

stirring. Fragments of fibrin foam are then dipped into the thrombin solution and removed and used as indicated. Pieces can be cut in accordance with the size that is desired. A piece of foam dipped in thrombin solution is removed and placed against the vessels that are bleeding, and a moist cotton pledget is held against this until bleeding is arrested. This method is useful, especially for venous hemorrhage and in oozing from vessels in the brain; it is not considered practical for arterial bleeding.

At the Walter Reed Hospital various types of cases were used to find out the value of fibrin foam. There were 102 cases of ruptured intervertebral discs, 86 of peripheral nerve injury, 23 of tantalum plating of a skull defect, 9 craniotomies for brain tumors, 5 laminectomies, and 1 acute cerebral laceration. The extradural bleeding which so often accompanies the removal of the herniated nucleus pulposus was quickly and easily controlled by means of fibrin foam. It is well known that in treatment of peripheral nerve injuries a small vessel on the perineurium may be torn and this is a situation in which neither clipping nor the electrocautery is useful. However, a small piece of fibrin foam when held against the bleeding vessel quickly stops it, and makes it possible to obtain an anastomosis of the nerve in a completely dry field. In another situation, when cortical scars are being removed, there is often left behind a shallow crater in which there is oozing from small blood vessels. In this case, as in the other cases, the fibrin foam is placed in contact with the bleeding vessels, in the manner described, and is left in place. Fibrin foam has been found particularly useful in controlling the bleeding from the side of the pons which may accompany the complete removal of an acusticus tumor. In 1 instance the fibrin foam was used in an acute cerebral laceration caused by an explosion while the patient was welding a 50-gallon steel drum. After the small vessels of the acute cortical laceration were clipped and/or cauterized with the electrocautery, there was still diffuse hemorrhage in spite of warm saline packs. This bleeding was instantly controlled by round discs of fibrin foam. Although this was an isolated experience, it appeared that fibrin foam might be of use in acute cerebral lacerations. During this time of war this information may be of considerable significance.

In all of the procedures in which the hemostatic agent was employed, the hemorrhage was controlled instantly. No clinical untoward reactions that could be attributed to the use of the fibrin foam were observed. On 2 occasions in which the wounds were reexplored, an opportunity was afforded to observe possible tissue reactions from the fibrin foam, but in neither case was there any evidence that this method of hemostatis had caused any such reaction. It appears that this method of hemostasis promises a very good result for the future in war injuries involving the nervous system.

ADRIEN VERBRUGGHEN, M.D.

SURGERY OF THE THORAX

TRACHEA, LUNGS, AND PLEURA

Alexander, J.: Roles of Medicine and Surgery in the Management of Bronchiectasis. *Ann. Int. M.*, 1944, 21: 565.

From the point of view of treatment, it is important that a distinction be made between (1) cases of bronchiectasis in which there is no obstruction of the larger bronchi; (2) cases in which varying degrees of obstruction of the larger bronchi exist because of a foreign body, bronchial carcinoma or adenoma, tuberculous granulation tissue or fibrous stricture in the bronchial wall, or pyogenic granulation tissue and extrabronchial pressure by enlarged lymph nodes or other tumors; and (3) those relatively infrequent cases which present the characteristic symptoms of bronchiectasis but in which no bronchiectasis exists, the symptoms being due to allergic or asthmatic bronchitis, or true chronic catarrhal bronchitis. The presence or absence of bronchiectasis can be determined accurately only by good bronchograms, whereas differentiation between the first and second groups mentioned in this paragraph can best be made by bronchoscopy. Although bronchograms frequently reveal even partial bronchial obstruction, they do not reveal its nature.

Lobectomy is, without question, the treatment of choice for those patients (1) whose age, cardiorespiratory functional reserve, and general condition are suitable; (2) whose lesions are restricted to one lobe, to the right lower and middle lobes, to the left lower and lingular ("left middle") lobes, or, in some cases, to all the lobes of one lung (total pneumonectomy), to one lobe of each lung, or to two lobes of one lung and one lobe of the other lung (bilateral lobectomy); and (3) who have failed to attain a satisfactorily stable condition of improvement from nonsurgical treatment. Special additional reasons for performing lobectomy in childhood are that the dangers of bronchiectasis are particularly great then and that the removal of the lesions makes probable a normally long life of health in place of a probably short life with varying degrees of illness and disability. The indications for lobectomy may become further extended in certain cases of multiple-lobe bronchiectasis by the wider application of Churchill and Belsey's suggestion that in certain cases only the affected segments of the lobes be removed. This principle has been applied for a number of years in the removal of the lingular segments of the left upper lobe, which is technically simpler and safer here than in any other lobar segment.

The present safety of pulmonary lobectomy has solved the problem of treatment for approximately half the patients with bronchiectasis, but the other half are, for various reasons (especially because of extensive bilateral lesions), not suitable for the operation. Nonsurgical methods of treatment, if properly and faithfully carried out, can be made effective in greatly alleviating the distressing symptoms of the disease in a large majority of patients, in spite of the pessimistic opinions about the value of nonsurgical treatment that have recently been expressed by a number of physicians.

Postural drainage is the most valuable of the nonsurgical therapeutic measures. A bronchoscopy carried out immediately after a postural drainage determines the relative number of retained secretions and, therefore, gives an indication of the probable effectiveness of postural drainage.

Every bronchiectatic patient should have at least one bronchoscopic examination, not only because some otherwise undetectable, important intrabronchial lesion may be discovered, but also because the aspiration of secretions and the chemical shrinkage of the bronchial mucosa often bring about improvement in the symptoms, which in occasional cases (notably in children, but also in adults) is astonishingly great. Bronchoscopy is also of great value in preventing the development of bronchiectasis in early cases of pneumonitis or "unresolved pneumonia." An effective treatment, which should be immediately preceded by a postural drainage, and which may occupy from fifteen to thirty minutes, requires (1) that the bronchi containing secretions should be repeatedly aspirated until all free secretions have been removed (this is to be done both before and after the mucosa has been shrunken and the patient has repeatedly coughed on command), and (2) that equal parts of 2 per cent pontocaine hydrochloride and 1 to 1,000 epinephrine solutions, or other shrinkage drugs, be directly applied, step by step, to all parts of the mucosa that are swollen, and that an excess of the solution in the gauze pledgets be squeezed into those bronchi of the affected parts of the lung that are too small to be directly reached by the pledgets, or a small amount of the solution be injected into these bronchi.

Since the primary purpose of nonsurgical treatment is to bring about the maximal evacuation of secretion, cough medicines that check the cough reflex are not helpful, but harmful, and measures that promote expectoration are beneficial. Such expectorants as ammonium chloride, iodides, ipecac, steam inhalations, which may be medicated with benzoin or menthol, and the inhalation of a nebulized spray of 1 to 100 dilution of epinephrine solution may prove useful if the secretions are thick and especially viscid, and if expectoration is difficult.

Only in exceptional cases has chemotherapy proved useful. Intravenous arsenicals, which are especially dangerous in patients having a prolonged suppurative disease, have occasionally reduced pulmonary infection when it was caused chiefly by the Vincent group of organisms. The sulfonamides, whether given by mouth or by a nebulizer, have been

disappointing in chronic bronchiectasis although an excellent effect has been produced in a few patients.

Treatment of infection in the nasal sinuses, nose, mouth, and pharynx should be given and may improve the bronchiectasis symptoms.

General hygienic measures are indicated in most cases of bronchiectasis. Ideally, patients who have even mild fever and who are fatigued and underweight should be put to bed for a period of weeks or months under the sanatorium type of regimen, or should at least spend long hours in bed at night and two hours in bed after lunch. Generalized heliotherapy may be helpful as a hygienic measure, but should not be used in febrile patients or in those subject to recurrent attacks of pneumonitis. Anemia should be treated by blood transfusions if necessary.

The author found allergic desensitization disappointing.

In certain cases of bronchiectasis with repeated severe hemoptysis, temporary phrenic paralysis may stop the bleeding, but this operation should not be used if the patient has difficulty in raising his bronchopulmonary secretions.

The author is opposed to induced pneumothorax, roentgen-ray therapy, "the thirst cure," and the many operations that have been proposed, or used with poor results, before the operation of lobectomy was developed to its present status of safety and effectiveness. JOSEPH K. NARAT, M.D.

Shank, P. J.: Empyema of the Lung, A Review of the Literature and an Analysis of 169 Cases. *Am. J. Surg.*, 1944, 66: 224.

Empyema per se is rarely, if ever, a primary disease. It is most frequently secondary to pneumonia, influenza, or measles. Approximately 75 per cent of all empyema is due to the pneumococcus and 15 per cent to the streptococcus; the remaining 10 per cent is due to staphylococcal, influenzal, and other rarer types of organisms.

The diagnosis of empyema depends upon a septic temperature, flatness on percussion, roentgenographic findings, and the aspiration of pus from the chest. It is important that diagnosis be made early. Treatment consisting of thorough and rapid evacuation of the pus should be instituted, to spare the patient prolonged infection and complications. Frequent and early roentgenograms will produce many more early diagnoses. Roentgenograms should be made in the oblique as well as the frontal and lateral planes, as many interlobular, encysted, and pulmonary abscesses may be demonstrated. Of all the diagnostic procedures, aspiration remains the definite means of diagnosis after accurate localization of the pus by the roentgenograms. The aspiration of tuberculous pus may lead to disastrous results if the condition is treated by open or closed thoracotomy. Aspiration is also important in determining the proper drainage site. In location, empyema is usually found in one of the lower lobes, but it may be multiloculated. Recognition of multiple loculation depends upon careful study of posteroanterior, lateral, and oblique roentgenograms. The foci should be drained as they are recognized, either through the original or supplementary incisions.

In any treatment of pleural empyema, the objectives to be attained are: the nutrition of the patient, as complete and early drainage as possible, and expansion of the lung. To be excluded are: operative shock, mediastinal flutter, and chronicity. Ehler and Graham have stated that the first aim should be to save lives. Secondary to this are: (1) complete evacuation of the pus; (2) rapid elimination of toxicity and systemic effects: (3) sterilization and subsequent complete closure of the cavity, with obliteration of all foci of infection; (4) complete healing of the external wound; (5) restoration of the patient to his normal social and economic position; (7) avoidance of chronic empyema and recurrences; and (8) accomplishment of these results in as short a time as possible.

Aspiration should be used in all cases at the beginning of treatment and should be repeated before operation, to relieve mechanical embarrassment due to the accumulation of fluid in the pleural cavity, and to alleviate the toxic symptoms during the synpneumonic stage. Multiple therapeutic aspirations should be done in encysted empyema and followed by the injection of air, in order to outline the cavity in the roentgenogram. While the diagnosis of thoracic empyema should never be made without the introduction of a needle and the removal of pus, the treatment of empyema by multiple aspirations should not be continued after four or five aspirations unless the patient shows a marked response to the treatment.

Intercostal closed drainage is advised particularly when reassimilation of fluid after aspiration is so rapid that even daily aspirations fail to give adequate relief. Closed operations are those in which a catheter is inserted into an empyema cavity through an intercostal space without exposure of the parietal pleura. It is believed that no form of closed drainage stays absolutely airtight for more than a week or two. Airtight drainage for more than two or three weeks is rarely necessary. It should not be continued longer than this unless there is improvement shown by the clinical condition with a decrease in the size of the cavity and re-expansion of the involved lung. If a week or two of intercostal closed drainage does not prove adequate, especially in the pneumococcal type of infection, the patient's condition should be improved sufficiently to warrant open surgical drainage.

In properly selected cases, open drainage is one of the most efficient methods of treating empyema, since it allows exploration of the pleural cavity for the identification of bronchial fistulas and possibly accessory empyema pockets, and permits complete removal of all fibrin masses and the proper placement of the tube.

Patients with thoracic empyema, having a reduced vital capacity, are in a state of air hunger a greater part of the time; hence the anesthetic that gives the

least pulmonary embarrassment should be selected. It must (1) avoid reducing the vital capacity below the level to which the patient has become accustomed during his illness; (2) allow the lateral position of the patient on the operating table, on his sound side; (3) prevent loss of blood, as the thoracic wall is a very vascular bed; and (4) deal with the copious amount of sputum. Diagnostic and therapeutic aspirations can all be performed following the local infiltration of novocaine or of one of its derivatives. Rib resections can be done under local anesthesia, but some patients object to the cutting of the rib and a general anesthetic must be given. Ethylene is a good general anesthetic and seems to meet all requirements. It has the added advantage of allowing a higher intake of oxygen. Cyclopropane maintains the highest percentage of oxygen in the circulating blood, which factor is so important in patients with a reduced vital capacity. Unfortunately, in a certain percentage of patients who have cardiac lesions, cyclopropane is contraindicated and may prove fatal by producing ventricular fibrillation. Positive-pressure anesthesia should be used when the pleural cavity is opened. Endotracheal anesthesia and suction must be employed in the presence of copious amounts of sputum.

The postoperative treatment of thoracic empyema, particularly in children, is of paramount importance, for on it depends the rapid and complete recovery of the patient. Adherence to minute details is mandatory, to prevent too early closure of the cavity and a resultant chronic infection. Physical examination of the chest is of little value. Frequent estimations of the capacity of the cavity along with frequent roentgenograms are the only accurate method of determining progress of the disease. Following the evacuation of the pus and the receding in size of the empyema cavity, the re-expansion of the lung is followed closely. Blow bottles have long been used to aid and increase the speed of re-expansion of the lung and of reduction in size of the cavity. It is difficult even now to make any final remarks on the efficiency of the sulfonamide drugs in the treatment of pneumonia, since there are so many variable factors in its treatment. A few facts of significance have emerged: namely, sulfanilamide does not produce any dramatic change in the course of hemolytic streptococcal pneumonia, and it does not seem to reduce the incidence of empyema. Lastly, but most important in the postoperative care, is maintenance of the patient's nutrition. He should receive a well balanced, high caloric, high vitamin diet. The loss of plasma proteins from the large, raw necrotic area of the pleural abscess cavity may be compared to the loss of plasma proteins from a burn of like size and must be replaced by transfusions of plasma, as well as of whole blood.

Empyema complications result in most instances from long delayed treatment. If not drained surgically, the pus may burrow in many directions and cause perforation into a bronchus or empyema necessitatis, or perforation into the trachea, esophagus, pericardium, blood vessels, or mediastinum. Occasionally, it may penetrate the diaphragm to the peritoneal cavity or to the extraperitoneal region. Transdiaphragmatic and retrodiaphragmatic extension of infections may occur. Infections of the chest wall are not regarded as serious complications and are rather infrequent. Scoliosis is a complication of empyema which varies directly with the duration of the empyema and inversely with the patient's age.

A proper understanding of the pathology and pathological physiology of acute empyema, and its application to the treatment of the disease would render chronic nontuberculous empyema a clinical rarity. If there is evidence of a considerable cavity four or five weeks after drainage of the purulent exudate, and if the tissues are not well healed about the tube, it is well to do a secondary rib resection and remove the rib above or below the original drainage. This also holds true for any secondary abscess draining into the main empyema cavity. Hindrance of the free outflow of the discharge in a secondary cavity results in more invasion of the wall and more protective response from the surrounding tissue. Chronic empyema implies attenuated infection, such as might readily occur with an intermittent discharge slightly slower than the accumulation or with an undrained discharge. The essential cause is granulation tissue which replaces the pleura under repeated infection. Another cause, fortunately not common, is the presence of foreign bodies in the pleural cavity. In the treatment of chronic empyema, the more conservative method should be given a fair trial before more mutilating ones are attempted. Carter lists the three classes of chronic empyema requiring surgery as follows: (1) secondary tuberculous empyema, (2) pyogenic empyema of several years' duration, and (3) chronic empyema with bronchial fistula. Three unroofing operations of short duration are preferable to one prolonged one. Empyema cavities decrease remarkably in size from one stage to the next, so that the ultimate amount of rib removal is less for the operation in stages.

Putrid empyema is a pathological entity deserving separate consideration. Effective treatment depends upon thorough knowledge of its pathogenesis, pathology, and clinical manifestations. The contents of a putrid empyema abscess cavity consist of foul pus and detritus gathered in one or more compartments. Following disclosure of foul pus or foul air, operation should be performed immediately, since nothing can be gained by delay and after the aspiration of foul pus there is a possibility of the development of putrid phlegmon in the chest wall. This usually dissects between the ribs and intercostal muscles and may not be recognized for several days. Immediate improvement is seen after evacuation, ventilation, and aeration of an anaerobic infection. Wide unroofing, allowing full visualization of the cavity, is imperative in order that drainage may be maintained to the bronchial fistula and for better drainage of the pulmonary abscess. Rib resection should be just short of the limits of the lesion to prevent entry

into the uninvolved portion of the pleural space. The cavity and all its recesses are then packed with iodoform gauze or zinc peroxide. Closed drainage is justified in putrid empyema only because of the danger of open operation when the mediastinum is mobile. A basic objection to closed drainage is its inability to eradicate the anaerobic infection without free ventilation. The mortality rate need not be high if there are early recognition, accurate diagnosis, and immediate treatment. Immediate open drainage gives the best results. All less radical methods give unreasonably high mortality rates.

The results in these 169 cases of nontuberculous thoracic empyema with 11 deaths are quite comparable to those in other recently reported series. The mortality rate of 6.5 per cent is recorded. The cases have been divided into two groups for study; one group comprises those patients twelve years of age and under, and the second group those over twelve years of age. The cases have been studied in three five-year series. There is very little difference in the mortality rate for these periods except in the last five-year period when the mortality rate for putrid empyema increased to 40 per cent. One hundred and five males and 64 females had thoracic empyema. There were 82 cases with involvement on the right side and 83 with involvement on the left side. Four patients had both sides involved. The pneumococcus, which was the most frequent organism found, was responsible for 73 per cent of the cases of thoracic empyema, the streptococcus for 20 per cent, and the staphylococcus for 3 per cent. The other types of organisms were responsible for the remaining cases of empyema. There were 9 cases of putrid empyema. Otitis media was the most frequent complication and associated condition. Treatment consisted of various operative procedures. Aspiration with subsequent rib resection and open drainage was carried out 91 times. Thirty-seven patients were subjected to aspiration and closed intercostal drainage followed by open rib resection. Sulfonamide therapy was used on some patients, mostly by the family physician before they arrived at the hospital, and it is difficult to evaluate the results. It has a beneficial effect in lowering the mortality rate, but it has not appreciably altered the development of empyema. CHARLES BARON, M.D.

HEART AND PERICARDIUM

Neuhof, H.: Indications for Pericardiotomy, with Special Reference to the Exposure of an Infected Patent Ductus. *J. Thorac. Surg.*, 1944, 13: 374.

In addition to the four standard indications for pericardiotomy, with or without drainage, (hemopericardium, suppurative and constrictive pericarditis, foreign bodies, and neoplasms), seven further conditions in the author's experience are described, with illustrative case histories, in the hope that other surgeons will join in broadening the indications for the procedure.

The first condition was that of neoplastic disease of the left lung, in which extensive adhesions to the parietes posteriorly rendered informative palpation of the posterior aspect of the hilus impossible. Pericardiotomy with palpation within revealed involvement of the nodes at the hilus and the inoperable character of the lesion.

In another case a pericardiotomy was performed to relieve the cardiac tamponade effect of a serous pericardial effusion during anesthesia in operation for tumor of the left lung. Exploration within the pericardial sac itself disclosed the inoperable character of the lesion.

A third patient was operated upon for a pulmonary neoplasm. The lesion appeared at first to be inoperable because of fixation at the mediastinum and invasion of the pericardium, but exploratory pericardiotomy revealed the extent of the invasion. Liberal sacrifice of the pericardium made possible an adequate excision of the tumor. In order to cover the large pericardial defect, the pulmonary tissue adjacent to the stump was approximated to the mediastinal tissues medial to and above the pericardial defect.

A fourth instance was that of a twenty-three-year-old man, with a history of abdominal distention for three months. On admission his abdomen was tense with fluid, and the blood pressure was 126/96, the venous pressure 19 cm. At operation the pericardium was apparently not thickened but it was somewhat opaque (restrictive pericarditis). Cardiac pulsations were normal. When the pericardium was incised it was found to be very slightly thickened. The lesion was an adhesive fibrosing one of the visceral pericardium. Visceral membrane was generously removed. The freedom from ascites subsequently (four years since operation) seems to suggest pericardiotomy in such cases, even in the presence of a pericardial sac which appears to be normal externally.

Another instance in which pericardiotomy seems indicated is when a patient does react well following initial pericardiostomy for the drainage of a suppurative pericarditis, in which cases undrained collections of pus are usually found at autopsy, or when the pericarditis does not clear up satisfactorily and a rather profuse discharge of pus continues from the wound. An instance of the latter type occurred in a boy of five years, who had been operated upon several weeks previously. The author again widely exposed the pericardium extrapleurally and carefully incised the sac without preliminary aspiration. Purulent exudate was encountered.

The sixth condition in the author's experience in which he believes pericardiotomy is indicated is that of acute pericarditis of low-grade virulence. In a woman of sixty-eight years, he explored the pleural cavity for the cause of an unexplained fever as the roentgenograms had been difficult to interpret; the pericardium, which appeared congested and possibly thickened, was aspirated and turbid yellow fluid was recovered; the culture was later reported

as sterile. The pericardial sac was laid open freely and found to be occupied by fibrinous exudate and small pools of yellowish fluid. The report on the specimen from the pericardium was acute inflammation. No organisms were found in the sections.

The last in the author's series of indications for pericardiotomy is a case of subacute endarteritis complicating a patent ductus arteriosus, in which it was thought that the exposure of the ductus for ligation, especially of its posterior, not easily attainable aspect, might be facilitated by incision of the pericardium and retraction of the dilated pulmonary artery. This procedure was tried in a woman of thirty years, in whom the blood culture was positive for the streptococcus viridans. At operation the mediastinal pleura was incised in the customary manner, and the recurrent nerve was visualized beneath the aorta. It soon became evident that dissection under vision would not be possible on the deep surface of the short, extremely wide duct. The pericardium was incised radially and freely over the region of the left auricular appendage, the incision prolonged to the beginning of the ductus, and the pulmonary artery was drawn downward and medially. The deep surface of the ductus was visualized and its dissection readily accomplished.

In the discussion HARRINGTON intimated that he does not need to do a pericardiotomy in his patients with a patent ductus because he always obtains adequate exposure through a posterolateral incision, which he described quite fully.

JONES cited Gross' objection to opening the pericardium when mobilizing the ductus arteriosus because the trickle of fluid from the sac obscures the field of operation, and stated that he himself has not seen a noninfected ductus arteriosus which required the opening of the pericardium for ligation.

HAIGHT described a personal experience with herniation of the heart through a large unclosed pericardial opening, which may be combated by turning the patient on or toward the contralateral side.

GRAHAM credited Sauerbruch with first describing the procedure of leaving the pericardium open for drainage into the pleural cavity, as in cases of intractable pericardial effusion, and he described a personal experience of this nature.

HEAD described an accident, tearing open of the left auricular appendage, incident to the opening and closing of the pericardium. The hemorrhage was finally mastered by grasping the entire appendage with an ovum forceps and ligating it back of the forceps. (The patient made an uneventful recovery except for two or three weeks when he had almost daily attacks of paroxysmal tachycardia.)

DOLLEY said that he believed that some type of drainage with rubber tissue to the outside or into the pleural cavity in cases in which a considerable quantity of serum is likely to form in, or in the environs of, the opened pericardium is a necessary safeguard against postoperative cardiac tamponade.

JOHN W. BRENNAN, M.D.

ESOPHAGUS AND MEDIASTINUM

Daniel, R. A., Jr.: Congenital Atresia of the Esophagus, with Tracheoesophageal Fistula. *Ann. Surg.*, 1944, 120: 764.

In the past three years 7 infants with congenital atresia of the esophagus have been admitted to the Vanderbilt University Hospital, Nashville, Tennessee. All of the patients were operated upon, and 1 is living at the age of six months.

The successful case was that of a male infant born at term. Thirty-six hours after birth it was noted that the child had an unusually large amount of mucus. At fifty-six hours the diagnosis was suspected and proved with x-rays. Operation was performed eighty-four hours after birth. A left posterior extrapleural approach was made under local anesthesia. The blind pouch was isolated and controlled with a silk suture. The lower end connected with the carina. A catheter was inserted through the nose and passed out of the blind loop through a small incision made in the lower end. The lower segment was doubly ligated and separated from the carina. The catheter was inserted into it below the ligature. Silk sutures were used to anastomose the upper end with the lower end below the ligature. The wound was closed and traction applied to the catheter. Gastrostomy was performed seven days later because the catheter became obstructed. Three weeks after the gastrostomy the catheter was removed and dilatations were begun and have been continued at weekly intervals.

The fistula should be exposed and ligated in all cases. An anastomosis is then attempted. In some patients it will not be possible to made the anastomosis. In these cases the upper end is brought out in the neck and a gastrostomy performed.

THOMAS F. THORNTON, JR., M.D.

MISCELLANEOUS

Goldman, A.: Aerial Evacuation of the Thoracic Wounded; Consideration of Effects of Altitude. *U. S. Nav. M. Bull.*, 1944, 43: 685.

Aerial evacuation of the wounded from combat areas has become a common practice in this war. No medical problems have been confronted except in the care of wounds of air-containing organs. In order to determine the effect of aerial evacuation in chest injuries, the author studied 30 such patients. The advantages of air transport were found to be the shortened travel time, a smooth trip, ease of loading, and minimal handling. It is possible in the South Pacific area to fly at altitudes of 500 feet, and heights of over 3,000 feet are avoided. Higher altitudes can produce emergencies. All pleuropulmonary wounds are associated with varying degrees of cardiorespiratory disturbance. Altitude tends to increase that disturbance, but significant changes due to altitude are not likely to occur under heights of 3,000 feet. Air entrapped in the body is affected by altitude according to Boyle's law, which states

that the volume of any gas varies inversely with the pressure, provided the absolute temperature remains constant. Lovelace and Hinshaw state that the increase of altitude has the effect of producing considerable increase of either the volume of air in the freely expanding pneumothorax or the positive pressure within the pneumothorax if expansion is restricted. Table I demonstrates the relative volume of gas entrapped in the body at various altitudes.

TABLE I.—GAS ENTRAPPED IN BODY

Volume of gas	Altitude in feet	Barometric pressure mm. Hg.
1.0	0	760
1.2	5,000	630
1.5	10,000	520
1.9	15,000	430
2.4	20,000	350
3.0	25,000	280
4.0	30,000	230
5.4	35,000	180
7.6	40,000	140
8.8	42,000	130

A freely expanding pneumothorax simply expands at higher altitudes, and the amount of expansion can be calculated from this table. In the case of a nonexpanding pneumothorax the positive pressure becomes higher with ascent, and marked pain and dyspnea may occur. This is particularly dangerous since it may cause rupture of adhesions. A closed tension pneumothorax should be decompressed by aspiration or, in an emergency, by converting it into an open pneumothorax. A sucking wound is best treated by converting it into a closed pneumothorax, and aspirating. Mediastinal and subcutaneous emphysema offers hazards since the entrapped air will also expand and may cause severe obstruction to the contiguous structures. Air entrapped in the pericardium may expand to the extent of causing tamponade. In the case of diaphragmatic hernia the expansion of gas in the stomach and bowel decreases the pulmonary volume and may cause strangulation of the bowel.

Since the weather conditions, mountains, and enemy action may force ambulance planes to high altitudes, the flight surgeon should have the equipment and training to manage any emergencies that may occur. If this is done, air evacuation offers many advantages. Transportation is usually delayed until pleuropulmonary wounds are stabilized because most severe fresh injuries demonstrate dyspnea, shock, pain, and fear.

THOMAS F. THORNTON, JR., M.D.

Ritvo, M., and Peterson, O. S., Jr.: Parasternal Diaphragmatic Hernia. *Am. J. Roentg.*, 1944, 52: 399.

Diaphragmatic hernia is defined as the protrusion of any abdominal viscus into the thoracic cavity through an opening in the diaphragm. The following classification of types is suggested:

A. Nontraumatic
   1. Congenital
      a. Esophageal hiatus
      b. Pleuroperitoneal foramen of Bochdalek
      c. Dome of diaphragm
      d. Foramen of Morgagni
      e. Absence of a portion of the diaphragm
   2. Acquired
      a. Esophageal hiatus
      b. Pleuroperitoneal foramen
      c. Foramen of Morgagni

B. Traumatic
   1. Blows to abdomen
   2. Penetrating wounds
   3. Perforation of subphrenic abscess or empyema

Three groups of muscles fuse into a central tendon to form the diaphragm. These muscles arise from the sternum, ribs, and lumbocostal arches. Lack of fusion of the sternal and costal muscles forms the so-called foramen of Morgagni with the development of the parasternal diaphragmatic hernia, which is the basis of the present discussion. This type of hernia is exceedingly rare although it was first recognized by Morgagni in 1769. By 1939, a total of 120 cases had been recorded in the literature.

These hernias occur more frequently on the right side because of the more extensive attachment of the pericardium to the left anterior chest than to the right. The contents of the hernia usually comprise the omentum and transverse colon. For this reason the barium enema is used in the usual diagnostic roentgen study. The symptoms are usually constipation and pain in the chest, but many hernias cause no symptoms.

X-rays show a density over the lower portion of the right lung field. If the colon is present in the hernia, gas may be observed. Barium studies of the stomach usually show no abnormality, but varying degrees of displacement of the colon may be visualized.

In the past treatment has been conservative in most instances, unless strangulation had occurred.

THOMAS F. THORNTON, JR., M.D.

Holmes, H. R.: A Case of Patent Ductus Arteriosus Associated with Multiple Pulmonary Aneurysms and Infective Endocarditis. *Brit. J. Radiol.*, 1944, 17: 312.

The author records a case of patent ductus arteriosus in which there was subacute bacterial endocarditis and multiple aneurysms of the larger branches of the pulmonary artery. The clinical description, roentgenological findings, differential diagnosis, and postmortem findings are given with a discussion.

Ligature of the patent ductus was followed by cessation of the murmur; however, two days later the patient died immediately after a copious hemoptysis.

Left and right anterior oblique films with barium confirmed the findings in the posteroanterior film and showed the absence of auricular enlargement, an apparently normal aorta, and slight enlargement of

the left ventricle. From the changes seen in forced expiration and inspiration films, it was considered that the bilateral radiating opacities were probably caused by pulmonary arterial branches and their local dilatations due to possible aneurysms. The presence of congenital rib anomalies suggested that an associated congenital cardiac lesion might be responsible, in part at least, for the abnormal shadows.

Patent ductus arteriosus is more frequently associated with other cardiovascular anomalies, and there is a known variance in the clinical signs and x-ray appearances. Therefore, full roentgenological investigations are essential in the clinical assessment of the indications for timely surgery in the cure of patent ductus arteriosus.

EMIL C. ROBITSHEK, M.D.

Wolpaw, S. E., Higley, C. S., and Hauser, H.: Intrathoracic Hodgkin's Disease. *Am. J. Roentg.*, 1944, 52: 374.

The typical peripheral manifestations of Hodgkin's disease are well known, but the internal disorders, particularly intrathoracic manifestations, are less well recognized. This study includes 55 cases, of which 35 (63 per cent) showed intrathoracic involvement. The various types of intrathoracic Hodgkin's disease are: (1) mediastinal, (2) parenchymal, (3) pleural, (4) osseous, and (5) cardiac.

The mediastinal variety was the most common in this series since 50 per cent of the cases were in this group. Any of the lymph-node structures in the mediastinum may be involved, but in most cases localized enlargement of the hilar nodes is present. Occasionally, involvement is diffuse.

The parenchymal type occurred in 40 per cent of the series and presented the most confusing diagnostic problems because it varies so much and can easily be mistaken for almost any other type of pulmonary disease. Particularly common is an infiltrative lesion that can easily be mistaken for bronchogenic carcinoma. Nodular lesions are uncommon and simulate metastatic tumors. Peribronchial and bronchial invasion may produce atelectasis like that seen in primary lung tumors. Cavitation occasionally occurs when there is necrosis of tissue with extrusion through the tracheobronchial tree. Tuberculosis, abscess, or cavitary bronchogenic carcinoma may be suspected.

Pleural involvement is quite frequent and usually takes the form of multiple nodules that produce massive effusions which can be confused with tuberculosis or carcinoma. The ribs and sternum may show involvement primary or secondary to the lung. The osseous lesion is usually osteolytic. The cardiac type is extremely rare and usually secondary to mediastinal or parenchymal involvement.

Twenty-three of the 35 cases were treated by irradiation. Seventeen cases considered to be adequately irradiated showed definite favorable responses of varying degrees. Three patients with adequate, and 2 patients with inadequate dosage showed no favorable response, and in 1 case the result was not recorded. The technical aspects of roentgen therapy are discussed.

THOMAS F. THORNTON, JR., M.D.

SURGERY OF THE ABDOMEN

ABDOMINAL WALL AND PERITONEUM

Martin, D. J.: Active Convalescence of Hernial Repairs. *Brit. M. J.*, 1944, 2: 531.

During investigations into the causes of the high incidence of postoperative respiratory complications in armed forces after hernial repair, it was shown that the incidence and intensity of symptoms were lessened in the cases in which there were early motions and, in particular, in those in which the patients got out of bed.

It was found that the types of cases presenting the highest incidence were the group of hernial repairs and, to a lesser extent, the appendectomies. It was, therefore, determined to get all the men up the day after operation.

At the beginning of this investigation various operations were used, viz., the Bassini operation, simple removal of the sac, fascial grafting, and, finally, the slide repair as described by Tanner, but, as the series went on, the operation of choice became the simple removal of the sac. The great majority of the cases have been indirect inguinal hernias. The author used catgut in all of his operations.

Active convalescence has been found to accelerate recovery in bronchitis, pneumonia, and even carditis, in which instances functional activity, carefully graduated, enhances convalescence. The routine of activity that the patients are encouraged to accept is as follows:

On the first day after operation they get out of bed and walk a few steps to a low armchair. There they find that they can sit in greater comfort than in bed and that the greater flexion of the hips helps to support the inguinal canal so that they can cough with less strain. They are allowed to sit up as long as they enjoy it. On the next day they get up for two similar periods, and are told that they may walk to the lavatory if they want to. Not many avail themselves of the permission until the third day. From that time they are told that they may do anything that they can do, and they are up the greater part of the day. Many play billiards, help with light ward duties, and walk about the grounds. They are given no specific exercises until the eighth day, when they begin graduated physical training with a sergeant instructor.

A questionnaire has been sent out to 200 consecutive patients one year after operation, and reports have been received from 123. Among those who replied there have been 8 recurrences (6.5 per cent).

The author concludes from his investigations that the rate of recurrence of inguinal hernia is higher than is often realized, but early activity is not a factor leading to recurrence.

JOSEPH K. NARAT, M.D.

GASTROINTESTINAL TRACT

O'Donovan, E. J., and Murphy, F. D.: Extrarenal Uremia: Report of 2 Cases Due to Pyloric Obstruction. *Ann. Int. M.*, 1944, 21: 662.

Extrarenal uremia is a clinical state characterized by elevation of the blood nitrogen, dehydration due to loss of extracellular fluid and electrolytes, normal or low blood pressure, and oliguria which may progress to anuria. The diseases in which a significant degree of retention of nitrogen in the blood has been found to occur most frequently are those in which dehydration is a prominent feature. Such dehydration may be caused by excessive diarrhea, vomiting, insufficient intake of water, and diabetic acidosis. Nitrogen retention following massive bleeding into the gastrointestinal tract is due, in part at least, to the digestion and absorption of blood protein.

It has been suggested that the extrarenal uremia which supervenes upon high intestinal obstruction is due to hypochloremia. The error of this conception has been revealed by the production of hypochloremia in dogs by means of gastric lavage or vomiting, with, however, provision for sufficient food and water for the animals. No increase in nonprotein nitrogen occurred in the blood until immediately before death, although the chloride content of the blood had fallen to half its normal level.

Prolonged dehydration resulting from upper intestinal obstruction has been shown to produce definite impairment of renal function in dogs and in man, as indicated by the excretion of both urea and phenolsulfonphthalein.

Disturbance of the circulation seems to be present without exception in extrarenal azotemia. In those cases with a salt deficiency, such as follows excessive vomiting, deterioration of the circulation is induced by dehydration. Loss of sodium leads to loss of water, and the latter takes place always at the expense of extracellular fluid. Consequently, the amount of circulating blood diminishes and the blood becomes more concentrated. Because of the reduced blood volume the circulation slows down, the blood pressure may fall, and the concentration of the serum involves an increase of the colloid osmotic pressure of the blood. The decrease of the blood pressure and the increase of the colloid osmotic pressure result in diminution of the filtration pressure, the extent of which in severe cases can be so great that the pressure ceases to exist at all. Diminution of the blood flow is a further factor largely inhibiting glomerular filtration.

The treatment of extrarenal uremia involves the replacement of water, sodium, and chloride; the maintenance of the normal circulation and volume of the blood; and the removal of the cause of the catastrophe. Shock, if present, must be combated

and blood transfusion probably will be valuable. The restoration of extracellular electrolytes and water is accomplished by means of subcutaneous or intravenous infusions of sodium chloride or one of their modifications. Seven thousand cubic centimeters of the fluid may be required daily. When acidosis is present, adjustment of the acid-base equilibrium may be accomplished better by means of the intravenous administration of sodium lactate. For alkalosis, the reduction of bicarbonate in the blood by ammonium chloride given orally or parenterally, the intravenous administration of dilute hydrochloric acid, or simply the intravenous administration of saline or hypertonic sodium-chloride solution have all been recommended. The intravenous administration of amino acids and blood plasma has been advised for hypoproteinemia. If food is tolerated, small feedings consisting of from 150 to 200 cc. of concentrated liquid or semisolid carbohydrate food should be given every two hours. Antispasmodics of the belladonna group are often of value in full therapeutic dosage. If nausea and vomiting are present, nothing should be given by mouth. When pyloric stenosis is present, the stomach should be aspirated at least once daily. Successful termination of azotemia which had been induced by pyloric obstruction has been brought about by gastrojejunostomy. Feeding of the patient through a jejunostomy prior to the gastrojejunostomy is recommended for selected cases when the uremia does not respond adequately to parenteral fluids for major surgical intervention.

Two cases of extrarenal uremia due to pyloric obstruction following long-standing peptic ulcer are reported by the authors. One patient recovered following operation, and the other died. At autopsy only insignificant renal damage, not sufficient to account for the uremia, was seen. Beginning malignant degeneration was found in the ulcer area.

JOSEPH K. NARAT, M.D.

Warren, S., and Meissner, W. A.: Chronic Gastritis and Carcinoma of the Stomach. *Gastroenterology*, 1944, 3: 251.

The material for this study is composed of 356 stomachs which were completely or partially removed for primary gastric carcinoma, or for peptic ulcer of the stomach or the duodenum. The stomachs were fixed in Zenker's solution; blocks were taken for the same representative areas from each specimen, and sections therefrom were stained with eosin-methylene blue.

The epithelial changes consist of alteration, apparently progressive, of the mucosal cells from the normal. The stages of alteration seem to be progressions of degree rather than difference in type. There is excessive formation of mucus, a diminution in the number of chief and parietal cells (Fig. 1), the formation of atypical glands—often cystic—(Fig. 2), and the formation of atypical gastric cells (Fig. 3). There is a progressive increase in the number of mitoses in the neck region of the glands.

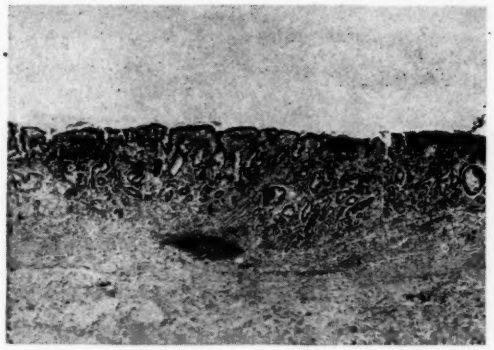

Fig. 1. Loss of specialized cells, thinning of mucosa—chronic atrophic gastritis.

From a study of the whole material the author concludes that the whole process of the development of chronic gastritis is a labile one with various stages, not necessarily progressing in severity and probably being reversible. However, when full-blown epithelial changes have occurred, reversal to normal epithelium must be difficult, if not impossible. This type of change is often seen in so-called atrophic gastritis, but is not restricted to it. Of course the number of carcinomas that arise from such a state of chronic gastritis is unknown; from the findings described it is only possible to say that one stage of chronic gastritis may show epithelial changes which are comparable to precancerous lesions elsewhere, and on these grounds the authors suggest that it may be assumed that some gastric cancers arise from this lesion.

In the discussion BURRILL B. CROHN of New York states that this is the first time that he has heard the suggestion that carcinomatous degeneration may occur on the basis of a hyperplastic gastritis. The few people who hold that the carcinomatous stomach

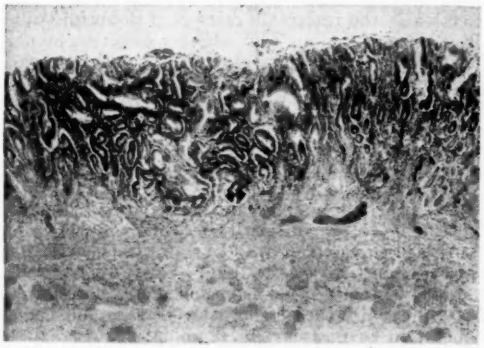

Fig. 2. Atypical glands. Cells lining these glands show frequent mitoses.

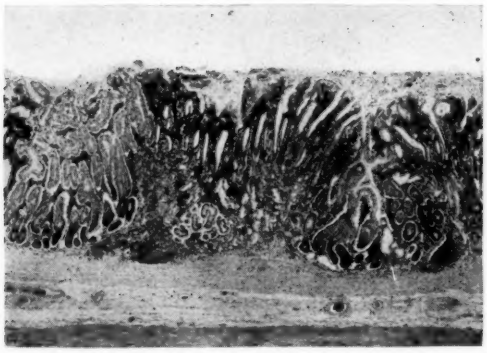

Fig. 3. Two islands of so-called intestinal epithelium.

develops on the basis of gastritis usually hold the theory that it is an atrophic gastritis.

In answer to Crohn's statements MEISSNER asserts again that he has found marked epithelial changes in severe gastritis, and believes that they were strictly comparable to well accepted precancerous lesions elsewhere, and that it is on this basis only that it is believed reasonable to expect that carcinoma may develop in the stomach from this change. JOHN W. BRENNAN, M.D.

Bisgard, J. D., and Overmiller, W.: Emergency Gastrectomy for Acute Perforation of Carcinoma of the Stomach, with Diffuse Soiling of the Free Peritoneal Cavity. *Ann. Surg.*, 1944, 120: 526.

Acute perforation of carcinoma of the stomach into the free peritoneal cavity occurs infrequently; it is usually unanticipated, and in many instances, the malignant character of the perforated ulcer is unrecognized, with the result that the case is managed as a benign lesion and treated as such. Routine frozen-section examination of a biopsy from the edge of all gastric perforations would reveal the presence of a neoplasm. Any surgical treatment short of resection in the resectable cases is of doubtful value. But there is the question whether resection be performed as an emergency gastrectomy in the presence of diffuse soiling of the peritoneum, or whether it be reserved for a secondary operation contingent upon recovery from the primary operation of simple closure of the perforation.

Because this and other questions relating to this entity can be answered only by the accumulation of many isolated individual experiences, it seemed justifiable to the authors to record their experience with a single case and to add a statistical compilation of the reported cases to date. A case report is described in detail. They have collected a series of 217 cases, in which the diagnosis has been established at operation or postmortem examination. In half of these cases no operation had been performed. In only 7 of the 217 cases was it alleged that a correct diagnosis had been made prior to operation or postmortem examination.

The failure to recognize the presence of carcinoma suggests that the majority of carcinomas which perforate are small and relatively confined lesions, presumably suitable for resection, a premise which is borne out at the autopsy table. In these cases there is, therefore, the possibility of considerable salvage of life. Approximately 50 per cent of carcinomas which perforate are otherwise resectable upon the basis of generally accepted standards. For resectable lesions, emergency primary gastrectomy is the operation of choice. The results of operative procedures in 115 cases of perforated gastric carcinoma are listed in a table, under procedure, recoveries, and hospital deaths. EMIL C. ROBITSHEK, M.D.

Rafsky, H. A., Katz, H., and Krieger, C. I.: Varied Clinical Manifestations of Lymphosarcoma of the Stomach. *Gastroenterology*, 1944, 3: 297.

This study is based on a series of 12 patients of whom 7 were males and 5 females. Their ages ranged from nineteen to eighty years. All of the patients came to operation. The symptoms of the patients covered a period of from four weeks to three years, with more or less gradual onset, the complaints differing from those of ulcer or perhaps resembling them; but on the whole there was no characteristic or typical history to indicate the presence of the disease, nor did the physical examination reveal it. The patients appeared to be chronically ill, but did not, as a rule, appear to be undernourished. Thirty-three per cent revealed a tumor mass in the abdomen. Roentgenography resulted in a definite diagnosis of lymphosarcoma of the stomach in 4 (33 per cent) and suspicion of neoplastic disease in 6 (50 per cent).

When x-ray findings are obtainable they may be grouped as follows: (1) a filling defect with smooth margins; (2) a localized type of filling defect, round and smooth when the body of the stomach is involved, and annular when it occurs at the pylorus; (3) a diffuse type of defect involving a large portion of the stomach and simulating carcinoma or linitis plastica; (4) a defect with the pattern of giant rugae; (5) in the late stages, the walls may be somewhat rigid, due to infiltration and yet peristalsis may be sluggish or irregular; (6) gastric retention, which is an uncommon finding; and (7) changes in the size of the stomach.

Gastroscopic findings were not as characteristic of malignancy as those seen in carcinoma of the stomach. Endoscopically, in 4 patients there was a marked hypertrophy of the rugal folds and the mucous membrane appeared to be intact although it was somewhat swollen and edematous. The entire gastroscopic field presented a stiffened appearance. Late in the disease, flattened ulcerated areas on the crests of the folds were seen. Even at operation, with the surgeon palpating the stomach in the open abdomen, the condition could not always be detected, although later microscopic examination of the resected stomach revealed in some cases that it was involved.

The latest reports on the x-ray treatment of lymphosarcoma of the stomach are very encouraging; of the 2 types, reticulum-cell sarcoma and the small round-cell lymphosarcoma, the first gave a less favorable response in this series.

The details of several illustrative cases are included. JOHN W. BRENNAN, M.D.

McKittrick L. S., Moore, F. D., and Warren, R.: Complications and Mortality in Subtotal Gastrectomy for Duodenal Ulcer; Report of a Two-Stage Procedure. *Ann. Surg.*, 1944, 120: 531.

In this article, the hospital morbidity and mortality in 175 subtotal resections, done in the period from 1936 to 1941, are analyzed and contrasted with the results in 145 resections done in 1942 and 1943. As one of the many factors producing improvement in the second group, a technique for the performance of subtotal gastrectomy in two stages is described. Of the 175 subtotal resections of the stomach (from 1936 through 1941), 55 were performed for gastric ulcer with no deaths. One hundred and twenty-four operations were undertaken for duodenal ulcer, with 10 deaths, a mortality of 8.1 per cent. The various types of operations are shown in a table. The 124 cases of duodenal ulcer were carefully studied from the point of view of fatal and nonfatal complications, and the results of this study are grouped in another table.

The experience of the authors suggested that the duodenal stump and its management played an important role in the morbidity and mortality following subtotal resection for duodenal ulcer. In 7 of their 10 fatal cases, the infection arose from the duodenal stump. The resection for exclusion, as conceived by Finsterer, seemed to them to represent the ideal first step of a two-stage procedure, having as its objective the safe removal of the entire lower two-thirds of the stomach. It was anticipated that after from six to twelve weeks had elapsed, the inflammatory process around the duodenum would subside, the ulcer probably would heal, and excision of the antral segment could then be safely undertaken. This procedure has now been carried out in 37 cases. It is the authors' opinion that the two-stage gastrectomy will find usefulness for the skilled and experienced gastric surgeon in occasional cases in which the inflammatory fixation of the pylorus and duodenum destroys landmarks and renders adequate duodenal closure difficult or impossible. The operative technique is described in detail and is well illustrated. Complications of the two-stage procedure are enumerated. The answer to the question, "Must the antrum always be removed?" is an unqualified "yes!" This conclusion is based upon three considerations:

1. Edkin's work demonstrating that a substance in the antral mucosa, when injected intravenously in dogs, produces a massive gastric secretion even in isolated gastric tissue.

2. The fact that 9 patients known to the authors, one of them in this series, developed jejunal ulcers when the antrum was left in for from three to thirty-six months after a Finsterer type of procedure.

3. The fact that all of these patients have had their jejunal ulcer cured by antral excision alone or in combination with a higher resection.

During the last two years there has been an improvement in the results in these cases, the most important factor, in the authors' opinion, being the almost complete elimination of those complications secondary to leakage or contamination from the duodenal stump. EMIL C. ROBITSHEK, M.D.

Mimpriss, T. W., and Etheridge, F. G.: Chest Complications after Gastric Surgery. *Brit. M. J.*, 1944, 2: 466.

The authors call attention to the frequency, the importance, and the severity of postoperative pulmonary complications in gastric surgery. A report is given of such conditions in 100 consecutive cases. For a correct appraisal of this incidence, some information regarding the condition for which operation was indicated in each instance, is necessary. The operative mortality, too, must be considered, as well as the standards by which the pulmonary complications have been assessed.

Gastrectomy is more difficult when it is done for a peptic ulcer for which a previous operation was performed. Moreover, greater difficulties are involved when a bleeding ulcer or a malignancy is present. Accordingly, the cases considered are classified as follows: (1) patients with peptic ulcer who had not previously undergone surgery, apart from the suture of a perforation (78 patients, 1 fatality); (2) patients who had previously undergone surgery (11 patients, 2 fatalities); (3) patients with complications such as acute hemorrhage (5 patients, 1 fatality); and (4) patients with carcinoma of the stomach (6 patients, no fatalities). From this it will be seen that gastrectomy was performed for the usual indications. Of the 100 patients, 4 died.

Physical examination of the chest was routine during the first two or three postoperative days. Any abnormal rise in temperature, pulse, or respiration rate suggesting the possibility of a pulmonary complication called for roentgenography. Of the 100 patients, 45 were subjected to roentgenography within the first few days after operation.

Among the primary types of immediate pulmonary complications found are: (1) bronchitis, (2) lobar atelectasis, and (3) lobular or patchy atelectasis. The authors diagnosed bronchitis in patients who had a productive cough with moist sounds in the lungs, even though x-ray examination showed no abnormality. Lobar atelectasis implies an involvement of one or more lobes, a condition which is easily demonstrated by roentgenography. The authors found lobular or patchy atelectasis the most common complication. In most cases physical examination showed that the lower part of the chest on one or both sides was expanding somewhat less fully than normal, and auscultation revealed a poor air entry, with some adventitious sounds. There would be a

rise in temperature, often not above 100, and the patient would have the inclination to cough but would experience difficulty in doing so. Coughing was encouraged during the first or second day, to bring up some mucopurulent sputum. Following this, the pulmonary condition rapidly improved and returned to normal. Roentgenograms of the chest in a patient of this type showed slight elevation of the diaphragm together with a slight patchy increase in the density of the lung at one or both bases. In none of the cases in this group was any mediastinal shift detected, either by examination or by roentgenography. In a few patients this condition progressed to a bronchopneumonia.

Summing up, the results of the present series showed that of 100 patients, 34 were classified as suffering from a postoperative pulmonary complication. Of these, 4 had bronchitis, 1 lobar atelectasis, and 29 lobular atelectasis. Of the 34 patients with a pulmonary abnormality, 28 suffered from a mild and transient complication, while 6 had severe pulmonary disease. Three of the 6 died, but only 1 death was directly attributable to the chest complication. In 1 of the 3 who recovered, the severity of the pulmonary condition was due to peritonitis following an attack of appendicitis. In this series, 6 developed a serious pulmonary complication, which was attributable to postoperative peritonitis in 3 cases; the condition of the 3 other patients had been otherwise satisfactory.

The influence of various factors on postoperative pulmonary complications is discussed at some length. Among these factors are: (1) the kind of operation and its technique, (2) the type of anesthesia, (3) the postoperative condition of the patient, (4) the effects of sex, (5) the seasonal incidence of chest complications, and (6) the treatment of the pulmonary complications.

As to the operation, it is well known that upper-abdominal operations are chiefly responsible for postoperative pulmonary complications because diaphragmatic respiration is embarrassed. Local peritonitis and postoperative distention of the stomach are likely to accentuate this embarrassment. Postoperative pulmonary atelectasis is likely to follow an operation which gives rise to a severe peritoneal inflammation. In the present series, autopsies showed that 2 of the patients had septic bronchopneumonia which appeared to be secondary to peritoneal inflammation. The authors claim to avoid any chance of postoperative distention of the stomach by the use of an indwelling Ryle's tube for at least the first postoperative day.

A transverse abdominal incision has been recommended by some authorities as a means of allowing the patient to cough or breathe deeply after the operation with less discomfort than is the case when a vertical incision is employed. The authors used a transverse incision on 35 occasions with the result that 12 of the patients suffered from postoperative pulmonary complication, while 23 did not. They conclude that a transverse incision has no influence on the incidence of complications. They consider it of vastly greater importance that, whatever incision is made, it should be very well and strongly sutured and reinforced with elastoplast, applied so that it does not restrict respiratory movement. This makes it easier for the patient to cough.

The authors believe that the type of anesthesia influences the severity of complications more than the incision. A patient who develops lung complications after two and a half hours of third- or fourth-plane narcosis, will be less able to combat them than a patient who has been in the second plane for a similar period.

Some sort of regional block is considered necessary to provide the requisite relaxation for gastric surgery while the patient is kept in the first or second plane of narcosis. The authors use bilateral intercostal block of the sixth to the eleventh nerves, inclusive. The solution employed is 1/1,000 anethene with adrenalin. They consider a splanchnic block unnecessary with inhalation anesthesia. Omnopon-scopolamine is used for premedication, the average dose being omnopon (gr. ⅓), scopolamine (gr. 1/150). The narcosis is induced with pentothal and is maintained with cyclopropane administered by a large-bore endotracheal tube and to-and-fro absorption. The entire operation can be undertaken with the patient in the second plane, the only exception being that the third plane becomes necessary for two procedures, namely, intubation and traction of the stomach to free the upper end. This technique permits good ventilation to be maintained throughout, and, since breathing is mainly intercostal in character, this does not embarrass the surgeon.

It has been pointed out by Nosworthy that the bronchial spasm following intubation in light anesthesia should be avoided in patients in whom pulmonary complications are feared. It was the practice of the authors to give a decicain lozenge twenty minutes before operation and to intubate after a pentothal induction. This process gives rise to considerable reflex bronchospasm and can be avoided by deepening the anesthesia to the third plane with cyclopropane and ether if necessary.

Under the technique described the patient is as fit as possible after the operation; a fall in the blood pressure and sweating do not occur. Aeration has been maintained throughout with a mixture containing a large percentage of inert gas (either air or helium). The authors believe that the agent employed for the narcosis is not of paramount importance; a few of their patients were given ether, and the postoperative condition was satisfactory. They prefer cyclopropane because of its flexibility and the lack of toxicity when used in the lighter planes, but they do not hesitate to supplement with ether should the necessity arise.

The patient's postoperative condition should be good if the surgery and the anesthesia are of good quality. This obviates the need for frequent injections of morphine and therefore avoids subsequent depression of the respiration.

As to the effects of sex, the authors state that in their series the incidence was about the same in both sexes. Of the 100 patients admitted for operation, 14 were females; 4 of them suffered from pulmonary complications. Since most of the patients had been under medical treatment and their smoking had been curtailed, or stopped altogether, this may explain why the incidence was about the same in both sexes.

As to seasonal incidence of chest complications, the authors did not notice any effect caused by the season. It is a well recognized fact, of course, that a patient suffering from chronic bronchitis is a better operative risk in the summer than in the winter. Also, the presence of an epidemic, such as influenza, seems to increase the severity of any pulmonary complication which may appear, and may lead to a troublesome infection in a partially atelectatic lobe. Naturally, too, it is important to postpone operation should a patient show any evidence of respiratory infection.

Treatment of pulmonary complications is discussed from two angles, the prophylactic and the curative. Satisfactory prophylactic treatment is best obtained by keeping the patient active and his lungs fully aerated during the postoperative period. The authors give preoperative breathing exercises to each patient so that he will know what is expected of him after the operation. Postoperative breathing exercises are begun the day after operation, and in most cases heavy percussion of the thorax by the masseuse is allowed during the first postoperative day. Movements in bed are encouraged, and the patients are rolled for washing purposes on the first postoperative day, unless their condition is unusually poor. Clinical examination of the chest is a routine for the first few postoperative days, for both diagnostic and therapeutic purposes. The authors believe that the movement and the activity involved in the clinical examination of the chest have a useful therapeutic effect. Coughing is encouraged by all those who deal with the patient.

Should a pulmonary complication be diagnosed, frequent-breathing exercises and heavy percussion of the chest are relied upon to assist coughing and expectoration of the sputum. The authors try to keep their patients as active as possible in bed, as movement often forces an unwilling patient to cough. Occasionally, suction through a tracheal catheter is used both as a prophylactic at the end of operation and as a therapeutic measure when there appears to be difficulty in coughing. It seems to assist subsequent expectoration. Patients who have undergone partial gastrectomy are naturally not subjected to bronchoscopy within the first few postoperative days, but this means has been effectively used for patients with rather less severe operations.

It is difficult to draw a hard and fast line in determining what constitutes a postoperative pulmonary complication. Slight abnormalities, no doubt, are frequently the natural sequelae to all major surgical operations. It is the more severe types of postoperative chest complications that must by all means be avoided. Success is in great measure dependent upon the satisfactory postoperative condition of the peritoneal cavity. No amount of postoperative treatment will prevent the severe chest complications which are due to an unsatisfactory postoperative peritoneal condition.

MATHIAS J. SEIFERT, M.D.

Consales, P. A., and O'Connell, W. T.: The Use of Blood in the Treatment of Duodenal Fistula. *N. England J. M.*, 1944, 231: 582.

External duodenal fistula constitutes a problem of great importance, and if not corrected it usually terminates fatally. Fortunately, it is a rare complication. Within the last two decades the prevalence of this disease has increased, perhaps because of the greater number of operative procedures carried out in the right upper quadrant of the abdomen.

The mortality is still extremely high. Most authors consistently report an approximate mortality of 50 per cent, irrespective of the procedures used, whether medical or surgical. Management along conservative measures, however, has considerably reduced the mortality. Conservative treatment has become the procedure of choice within the last ten years, and surgery has been reserved for cases in which there is a definite indication for it.

External duodenal fistula is usually caused by injury to the duodenum during the performance of a surgical operation in the right upper quadrant of the abdomen, such as that on the duodenum itself, the pyloric end of the stomach, the gall bladder, the liver, the hepatic flexure of the colon, and the right kidney.

In this article the authors present a case of external duodenal fistula following an operation for gallbladder disease in which all known therapeutic methods were tried, with extremely poor results. The effects of dehydration, acidosis, and the inevitable extensive and severe excoriation of the skin were so pronounced that a supposedly new method of remedying this trying situation was tried—the use of whole blood in the wound, and then packing the latter firmly with cotton. Following this procedure the duodenal fistula promptly ceased draining. There was immediate relief in the systemic symptoms, as well as a beneficial effect on the surrounding skin, with prompt healing of the fistula.

J. M. MORA, M.D.

Sibley, W. L.: Meckel's Diverticulum: Dyspepsia Meckelii from Heterotopic Gastric Mucosa. *Arch. Surg.*, 1944, 49: 156.

The vitellointestinal duct is a communication between the midgut and the yolk sac of the embryo during the first weeks of fetal life. Persistence of this duct or of portions of it give rise to a deformity known as Meckel's diverticulum. It has been estimated that from 15 to 20 per cent of the diverticula are subject to pathological changes which cause symptoms. The various anatomic types that can occur are mentioned and briefly described.

The pathological changes accompanying Meckel's diverticulum depend to a large extent on the anatomic deformities present. These are also briefly mentioned and discussed, although the ones most commonly found may be grouped into three categories: namely, (1) inflammatory type, (2) peptic-ulcer type (with or without hemorrhage), and (3) intestinal obstruction type (with or without intussusception). It would appear that another phase of the peptic-ulcer type is being seen and not being recognized. This, the author believes, is the group of diverticula that contain heterotopic gastric mucosa and which, when examined, show no evidence of inflammation or other disease. This condition might be called dyspepsia Meckeli and probably represents a preulcerative condition in the diverticulum or in the marginal portion of the ileum. The best classification is probably that of Greenblatt and his coworkers.

The symptoms and signs that occur from Meckel's diverticulum depend to a great degree on the anatomic disposition of the tissues and the pathological changes involved in the diverticulum. These factors are extremely variable. The signs and symptoms fall into three groups and are described. The treatment of Meckel's diverticulum is surgical, with excision of the diverticulum. Twelve case reports are cited. EMIL C. ROBITSHEK, M.D.

Berger, L., and Hirsch, E.: Bowel Surgery. Impressions after Five Years of Experience. *Am. J. Surg.*, 1944, 66: 31.

The data and "impressions" submitted in this report have been derived from a service of eight beds over a five-year period. There were a total of 116 patients with disease of the large bowel, of which 12 had chronic ulcerative colitis, and 22 had malignancy of the right colon, 10 of the midcolon, 43 of the left colon, and 41 of the rectum, while of the remaining 6, 2 had volvulus, 3 diverticulitis of the sigmoid, and 1 imperforate anus. The diagnosis was based on the symptomatology, the contrast enema, and sigmoidoscopy.

"The limits of operability have been extended to the point that only if the bowel is frozen, or the liver studded, is a palliative operation performed." Lymphatic metastases ranked high in all groups of colon cases, varying from 44 to 68 per cent, while vascular metastases varied from 22 to 29 per cent. Emphasis was placed upon the fact that the presence of distant metastases, especially in the liver, did not preclude resection of the local growth. Operability was further influenced to a marked degree by the presence or absence of obstruction. The deaths from acute obstruction occurred solely in those patients with obstruction in the left colon, mainly in the splenic flexure. In this group, with marked obstructive symptoms, death was the rule even though minimal decompressive procedures were utilized. Medical decompensation with a Miller-Abbott tube was not successful in these acute cases. Cecostomy was preferred to transverse colostomy. In addition, the subacutely obstructed cases which responded to medical decompression and were clinically so improved that no obstructive symptoms were manifested, showed dilated loops of bowel at operation. When radical surgery was attempted in this group, the mortality was high and the convalescence very stormy. The lessons learned from this group of patients were that it was better to perform minor preliminary decompressive procedures rather than immediate radical resection, and that operability for the most part depends on whether the patient is or is not obstructed, plus the intra-abdominal findings.

Preoperative blood transfusions to restore hemoglobin to 70 per cent, plasma transfusions, parenteral amino acids, and additional protein feedings were used to elevate the serum protein to a minimum level of 6 gm. Low blood-chloride levels were also corrected. Determinations of the blood-sugar level were routinely made in all patients with the result that diabetes was discovered several times in cases in which it had been totally unsuspected. Elevated urea nitrogen is in itself not a contraindication to operation, but its presence almost invariably suggests a stormy postoperative course. Prostatic hypertrophy with chronic urinary obstruction was investigated and if present was treated by staged or transurethral prostatic resection before the major bowel surgery. Various attempts were made to cleanse the bowel and reduce the bacterial flora and fauna of the intestinal tract in uncomplicated cases. The routine at present used consists of: (a) preliminary purgation, followed by (b) succinylsulfathiazole. No mechanical cleansing of the bowel was performed. The authors have noted that when they used either sulfanilamide or sulfadiazine, spinal anesthesia with procaine was not effective in the usual doses, or it was completely ineffective.

Shock was treated prophylactically by routine 1,000 cc. blood transfusions during and immediately after operation.

With the authors' meticulous preoperative rehabilitation of the patients, one-stage procedures became justified in most cases. Anesthesia was individualized to each patient, but whenever possible spinal anesthesia was the method of choice. However, colostomy closures were performed under inhalation anesthesia because cleanliness of even the posterior spinal region is always suspect in the presence of an open functioning colostomy.

Of 22 patients with lesions of the right colon, 12 were operable. There were 5 one-stage hemicolectomies with ileotransverse colostomies with 1 death, and 7 Lahey right hemicolectomies with 1 death. In lesions of the midcolon, the operation of choice was a Rankin obstructive resection. Ten patients with this condition were treated and 9 were resectable with no mortality. Carcinoma of the left colon was also treated by a Rankin obstructive resection with delayed establishment of colonic continuity. There were 43 cases of carcinoma of the left colon, 9 of the splenic flexure, 8 of the descending colon, and 26 of the sigmoid. Thirty were operable

with a mortality of 10 per cent. The operation of choice in carcinoma of the rectum was a one-stage combined abdominoperineal amputation of Miles. Eighteen of these patients had a one-stage combined abdominoperineal amputation with 1 death. Ten had a first-stage Lahey procedure. Of this group only 5 returned for the second stage, with 3 deaths. Eleven patients were inoperable and had only palliative colostomies. SAMUEL J. FOGELSON, M.D.

LIVER, GALL BLADDER, PANCREAS, AND SPLEEN

Armstrong, C. D., and Carnes, W. H.: Obstruction of the Hepatic Veins (Chiari's Disease). Report of 5 Cases. *Am. J. M. Sc.*, 1944, 208: 470.

The authors report 5 cases of a rare disease, hepatic vein thrombosis. Almost 60 cases had been reported. The thrombosis occurs most frequently where the hepatic veins empty into the inferior vena cava, probably because of eddy currents formed at the oblique entering angle. As thrombosis of the hepatic vein is often accompanied by inflammatory changes in the inferior vena cava, it is probable that the two processes are continuous. Hepatic vein thrombosis may be partial or complete, or complete with recanalization. Postmortem examinations reveal a characteristic central necrosis of the liver lobules, congestion of blood in this locality, replacement fibrosis of the liver, and splenic enlargement.

Obstruction of the hepatic veins has been equally distributed between males and females. The youngest person was seventeen months and the oldest seventy years of age. It occurs most frequently between the ages of twenty and forty years. It may occur in the acute or chronic form.

Pain over the liver, sometimes radiating to the back and shoulders, rapid accumulation of ascites resistant to diuretics, simultaneous enlargement of a smooth-edged liver and spleen, development of a collateral circulation, and edema of the legs suggest obstruction of the hepatic veins. This condition is rarely diagnosed during life as the clinical picture is that of obstruction of the portal vein and hepatic insufficiency.

The authors found 5 instances of hepatic-vein obstruction in 11,979 autopsies, an incidence of 0.042 per cent. In 3 cases the thrombosis was unimportant as a cause of death and probably occurred just before the patient died. In 2 cases there was recanalization and some collateral circulation. In 1 case there was a polycythemia. EARL O. LATIMER, M.D.

MISCELLANEOUS

Gillman, T.: A Critical Evaluation of the Neutral-Red-Excretion and Acid-Secretion Tests of Gastric Function in Normal Subjects, and in Subjects with Gastric Disorders. *Gastroenterology*, 1944, 3: 188.

The recent evidence concerning the wide range of acid secretion by normal subjects, as well as the fluctuations observed in the same subject on different occasions, has shaken the confidence of clinicians in the value of determination of the acid secretion as a diagnostic procedure. The method is rapidly losing its popularity. In fact, Schindler and Alvarez have recently expressed opinions which may be regarded as the death knell of fractional gastric analysis as a clinical test. The present investigation confirms the opinions recorded by numerous investigators concerning the limitations of the study of acid secretion in the diagnosis of gastric disorders, but provides information which promises a new lease of life to a modified form of gastric analysis in the clinic.

In this study it has been established (1) that the excretion of neutral red by the normal gastric mucosa is constant in the same subject on different occasions; (2) that disturbances in dye excretion can be easily recognized; and (3) that a disturbed neutral-red excretion can be regarded as evidence of gastric dysfunction. For these reasons alone, this test deserves recognition as a diagnostic procedure in the clinic.

Moreover, the modified neutral-red test has other qualities which make it invaluable both in the clinic and in the laboratory. It is simple, inexpensive, time-saving, free from unpleasant reactions, and, above all, it is extremely sensitive.

The improved neutral-red-excretion test, when the rate of excretion and concentration, as well as the intensity to which the injected neutral red can be concentrated, are recorded, has been shown to be an excellent indicator of the excretory function of the gastric mucosa.

This test has been applied to 90 individuals with apparently normal gastric function, and standards of normality have been suggested.

In 15 of these normal subjects both neutral-red excretion and acid secretion were examined repeatedly over a period varying from one week to six months. These repeated studies revealed that the acid secretion fluctuated considerably in the same subject, while the excretion of neutral-red remained remarkably constant.

From the study of 300 cases with gastric dysfunction, criteria of abnormal neutral-red excretion, expressed quantitatively, have been tentatively suggested. A comparison of the tests for neutral-red and acid secretions revealed that the neutral-red test is not only reliable but is also more sensitive than the acid-secretion test as an indicator of gastric function.

Acid secretion and dye excretion do not necessarily parallel one another, either in healthy or abnormal stomachs. It is suggested that acid secretion and dye excretion are indicators of two apparently independent functions of the gastric mucosa.

In view of its simplicity, reliability, and sensitivity, the neutral-red test can be recommended as a means of obtaining valuable information concerning the functions of the gastric mucosa both in the clinic and in experimental studies.

HARRY W. FINK, M.D.

Cleland, J. B.: The Length of the Small Intestine. *Med. J. Australia*, 1944, 2: 359.

The considerable variation in the length of the small intestine is the subject matter of this article. Naturally, with a variation in the length of the small intestine there is also a considerable variation in the amount of area occupied by its mucosa.

One would be led to suppose that with such a difference in area there might be a concomitant effect upon the physiology of the subject. However, persons with short intestines do not in any way appear to be handicapped during life. Whatever effect the difference in area of the small intestine might produce would now seem to be a matter of quite useless speculation.

In 1941, quite by chance, the author, who is professor of Pathology at the University of Adelaide, Australia, happened to notice during the course of a postmortem examination on a woman, aged fifty years, that the small intestine seemed very short. As it was detached, he proceeded to measure it and found that it was only 15 feet long from the termination of the duodenum to the cecum. This finding led him to make a series of measurements of the jejunum and ileum in more than 100 bodies. His observations showed that remarkable variations existed, ranging from 13 feet (in 2 cases) to 37 feet. The intestine (jejunum and ileum only) was measured after having been detached from the mesentery as close as possible to the intestine itself, in such a way that the gut scissors could rapidly slit up the lumen. Probably a number of small kinks were left, varying from subject to subject, so that all the measurements probably are somewhat less than the actual length.

Arranged in order (inches being neglected), the length of the small intestine in 100 subjects of both sexes was: 13 feet in 2, 15 feet in 2, 16 feet in 4, 17 feet in 2, 18 feet in 3, 19 feet in 4, 20 feet in 3, 21 feet in 12, 22 feet in 7, 23 feet in 16, 24 feet in 5, 25 feet in 6, 26 feet in 13, 27 feet in 9, 28 feet in 5, 29 feet in 2, 30 feet in 1, 31 feet in 1, 33 feet in 1, 35 feet in 1, and 37 feet in 1.

The author carefully lists the results of measurements in 60 male subjects and also in 40 female subjects. The figures show that the small intestine may be quite short in both males and females. However, whereas 5 of 60 male subjects had a small intestine of 30 feet in length or more, none of the 40 female subjects had a small intestine longer than 29 feet. The length did not seem to bear any definite relationship to the length or size of the subject. Even children may have a longer small intestine than some adults. In a boy, aged fourteen years, the small intestine measured 28 feet in length; in a girl, aged nine years, the measurement was 19 feet, 6 inches; and in a male infant, aged nine weeks, a measurement of 16 feet, 4 inches was found.

The author made a careful check-up in the cases of both the lowest and the highest measurements to ascertain what connection, if any, could be found between the diseases from which these subjects suffered and the length of the jejunum and ileum. It was impossible to determine whether disease conditions had any bearing on the length of the small intestine or vice versa.

Nature does indeed present strange incongruities. For example, an examination of the bodies of two full-blooded Australian natives gave the following findings: in a woman, aged twenty-two years, the small intestine measured 21 feet, 6 inches; in a man, aged thirty-five years, the length was 16 feet, 6 inches. In a female half-caste, aged thirty-five years, the small intestine was 28 feet long, and in a half-caste boy, aged twelve years, it was 21 feet, 6 inches long.

Surprising as these variations in the length of the small intestine are, it seems even more surprising to find that this difference in area seems to have no effect upon the physiology of the subject, nor upon the disease which caused the death of the subject.

MATHIAS J. SEIFERT, M.D.

GYNECOLOGY

EXTERNAL GENITALIA

Quinet, A. A.: Vaginal Cytology in Premature Puberty (Citologia vaginal na puberdade precoce). *An. brasil. gin.*, 1944, 18: 102.

In newborn infants the organism is impregnated with maternal follicular hormones and the cells of the vagina are therefore estrogenic in type. They are predominantly well defined squamous polygonal cells with a transparent cytoplasm, some of them with granules arranged around the nucleus, which is generally pyknotic, well defined, and small in comparison with the volume of cytoplasm. From the twenty-first day on the type of cells changes. The cells become round or oval with large nuclei and there is an abundance of mucus and of leucocytes. Some of the cells are surrounded by a translucent halo.

The author studied the vaginal cells in 3 little girls who showed precocious puberty. They were three years and seven months, seven years and eight months, and four years and two months of age, repectively, and showed well developed sexual characteristics. Though they were at an age when the second type of cells described would ordinarily predominate, they revealed a predominance of the estrogenic, squamous, polygonal cells. A similar type of cells can be produced in girls before puberty by the administration of estrogenic hormones.

There was another peculiar characteristic in the cells of these cases. There was a dark line running through the cells, in the oval ones along the long axis and in the round ones near the center of the cell. This line seemed to be caused by a condensation of the nuclear chromatin, and it was found chiefly in the most superficial cells of the stratum spinosum. AUDREY G. MORGAN, M.D.

Jeffcoate, T. N. A., Davie, T. B., and Harrison, C. V.: Intraepidermal Carcinoma (Bowen's Disease) of the Vulva (A Report on 2 Cases). *J. Obst. Gyn. Brit. Empire*, 1944, 51: 377.

According to Knight, the histological criteria for the diagnosis of Bowen's disease are: (a) hyperkeratosis and parakeratosis, (b) acanthosis with marked thickening of the rete malpighii, which appear club-shaped, (c) loss of stratification of the individual cells with disorientation, (d) the presence of nuclear clumping, "corps rondes," nuclear "grains," and mitotic figures, (e) an intact basement membrane, and (f) marked vascularity of the subpapillary zone with round-cell infiltration. He points out that it is usually necessary to examine several sections before finding all these features.

The appearance of the lesion to the naked eye shows some variation, but typically it is a dull red, raw area with a clearly defined circinate or serpiginous outline. The area is on the same level as the surrounding skin or, at most, is only slightly raised, but there is a sharp line of demarcation between the healthy and diseased tissues. The surface is moist but may become encrusted in part, the appearance of the lesion being very similar to that of Paget's disease of the nipple. It does not show any of the usual characteristics of malignancy: there is no friability or fixation, and metastases in lymphatic glands or elsewhere are rare. It may be confused with eczema, or with tuberculous or other ulcers, and Knight points out that when it occurs on the vulva it may be mistaken for kraurosis or leucoplakia. Indeed, the latter may occur with Bowen's disease.

Clinically, the disease runs a slow course, often lasting many years. It sometimes heals spontaneously in the central areas, while it advances at the periphery. It can at any time, however, change into a frank epithelioma, and this is true especially when it encroaches on mucous membranes. At such sites the change into epithelioma with rapid spread and the development of metastases are common.

On the vulva the lesion occurs at any age, before or after the menopause; the ages for recorded cases vary from twenty-five to seventy-three years with an average of approximately fifty years. In the second case reported here, however, the patient was eighty-one years old. The symptoms produced are pain and pruritus, the area often being extremely tender. In long-standing cases a history of remissions and exacerbations is the rule.

Two cases of intraepidermal carcinoma (Bowen's disease) of the vulva are described in detail. In the first patient the lesion ultimately spread to the vagina and immediately changed into epithelioma which rapidly assumed the most malignant characters. The clinical features of this condition are described, and the diagnosis, etiology, and treatment discussed. Special reference is made to its pathology and its relation to Paget's disease of the vulva. It is suggested that cases previously described as Paget's disease have in fact been cases of Bowen's disease and it is recommended that the name "Paget's disease" be restricted to the well known lesion of the nipple. The results of treatment in these 2 cases also substantiate other reports that the use of radium is not satisfactory and that excision of the affected area is preferable. In neither of these cases was the growth process arrested by radium application.

CHARLES BARON, M.D.

MISCELLANEOUS

Davis, A.: The Treatment of Amenorrhea with Combined Anterior Pituitary Follicle-Stimulating Hormone and Chorionic Gonadotropin. *J. Obst. Gyn. Brit. Empire*, 1944, 51: 401.

The author cites experimental evidence of the value of the combination of chorionic gonadotropin

and pituitary follicle-stimulating hormone, and states that it is more potent than either of its individual constituents as a gonodal stimulant. Twenty-seven patients with amenorrhea were treated by the preparation "synapoidin."

After the mechanism of menstruation was discussed, the rationale of treatment of functional amenorrhea with pituitary or pituitarylike gonadotropins, rather than by substitution therapy with estrogen and/or progesterone, was emphasized.

Clinical classification of amenorrhea, based on the organ presumably primarily responsible, is presented.

The dosage used was 1 cc. of synapoidin, given intramuscularly three times weekly for three weeks, after careful examination had been made to determine the cause of the amenorrhea. This examination included the basal metabolic rate, roentgenograms of the pituitary fossa, diagnostic curettage, and hysterography with lipiodol. The majority of the patients were of the primary pituitary type showing the characteristics of a mild Froehlich syndrome.

Occasionally, gross enlargement of the ovary was seen as a complication. This, however, gradually subsided after treatment was discontinued.

Results showed a permanent cure of 14 of the 27 cases, temporary improvement in 6, and no improvement in the remainder. The duration of the previous amenorrhea did not seem to affect the result.

The author believes this preparation is the best so far offered for amenorrhea, especially that of the pituitary type with a mild Froehlich syndrome. Frequent examinations are necessary to control ovarian hypertrophy. Hemorrhage is a contraindication to continuance of the treatment.

T. Floyd Bell, M.D.

Thomas, R. B., and Cannefax, G. R.: Sulfonamide Therapy of Gonorrhea. *J. Am. M. Ass.*, 1944, 126: 623.

The authors report the results of their experience in the treatment of gonorrhea in 555 women (200 negro and 355 white). All were hospitalized and under constant observation during the period of treatment.

The histories were of little value in making the diagnosis since the most frequent symptoms in the patients with gonorrhea, as well as in those without infection, were lower abdominal pain and vaginal discharge. Nonspecific cervicitis and vaginitis were frequently encountered. On admittance, cervical and urethral cultures and smears were taken in all cases; rectal and Bartholin smears were taken only when there was an indication of infection in these areas. Beginning five days after treatment, cultures were taken every other day, and if they were negative, until an uninterrupted total of 6 cultures had been examined.

All patients were started on sulfathiazole, with the exception of a few who were given sulfadiazine. The total dosage amounted to 20 gm., 1 gm. being given four times daily for five days; some patients were given a larger amount of the drug. If five days after completion of the treatment the cultures still were positive, a second course was given. Patients who did not then become negative were considered to be sulfonamide-resistant and were given foreign-protein therapy and sulfonamides. If this failed, artificial-fever therapy with a sulfonamide, or penicillin (10,000 units every three hours, for a total of 60,000 units) was used.

TABLE I.—RESULTS OF SULFONAMIDE TREATMENT BY RACIAL GROUP

Method of treatment	White (355)				Negro (200)			
	Cure		Failure		Cure		Failure	
	No.	Per cent	No.	Per cent	No.	Per cent	No.	Per cent
1st course, 5 days	214	60	141	40	181	90	19	10
2d course, 5 days	34	27	91	73	10	53	9	47
Total cures	248	70			191	95		
Total failures			107	30			9	5

The results obtained paralleled those for males. Seventy-one per cent of the patients were cured by the first course of sulfonamides, and 81 per cent were cured by either one or two courses of treatment. About one-third of those who were subjected to foreign-protein therapy, and 23 of 25 treated by artificial fever, gave negative cultures. Ninety-four per cent of the penicillin-treated sulfonamide-resistant cases were cured following the administration of a total of 60,000 units.

The disease was much easier to cure in the negro than in the white patient (Table 1). In no negro was it necessary to use artificial fever, and in only 1 instance was penicillin used.

In some complications of the adnexae and Bartholin's glands the sulfonamides failed to produce a cure, although clinical and symptomatic improvement was noted despite the fact that the cultures remained positive.

There were few cases of sulfonamide reaction. In 3 patients the ureters became blocked during hot weather. This was prevented subsequently by increasing the fluid intake. Three patients developed hematuria.

J. Robert Willson, M.D.

Greenblatt, R. B., and Street, A. R.: Penicillin for the Treatment of Chemoresistant Gonorrhea in the Female. *J. Am. M. Ass.*, 1944, 126: 161.

The sulfonamides are effective in curing a little better than 55 per cent of the cases of gonorrhea in the female. One hundred and nine patients were treated with penicillin, and of these 93 per cent had had one or more courses of sulfonamides. The total dosage of penicillin varied from 60,000 to 150,000 units. No untoward reactions were encountered.

Five patients received a second course of penicillin because of relapse. The second round of penicillin varied from 120,000 to 300,000 units. These patients remained negative after the second course of therapy.

Dosage should not be reduced to the minimum necessary for good results but should be maintained at a sufficiently high level so that the development of penicillin-resistant strains may be thwarted. To this end it is recommended that 150,000 units be used.

T. Floyd Bell, M.D.

Phaneuf, L. E.: The Changes in Operative Gynecology during the Last Quarter-Century. *J. Am. M. Ass.*, 1944, 126: 139.

The last quarter of a century has shown much progress in surgical technique with emphasis on careful dissection and ligation of individual vessels with fine material rather than mass ligature of the tissues. The treatment of carcinoma of the uterine cervix has changed from surgery to irradiation. However, a few gynecologists have again turned to surgery in well selected cases. Improvement in technique, and the use of blood transfusions and of the sulfonamides has lowered the mortality from the Wertheim operation.

The treatment of carcinoma of the uterine corpus and fundus still remains surgical, with ablation of the adnexa, with or without preoperative radium and postoperative high voltage x-ray therapy. Improvement here has also come through early diagnosis by means of curettage for women who bleed irregularly at or after the menopause.

Improvement in the operation of myomectomy has resulted in more conservative surgery of fibroids. In young women who are still in the childbearing age, the advantage of myomectomy rests in the fact that the functions of menstruation and reproduction are not abolished.

Supravaginal hysterectomy still remains the type of operation most often performed. However, an increasing number of gynecologists have turned to panhysterectomy as a prophylactic means against carcinoma of the cervical stump. The author almost entirely performs the total operation. If radium or x-rays are used for fibroids, a thorough curettage of the uterus should be done to rule out malignant disease. In the young, whose ovaries should be conserved, and in the good surgical risks, surgery is still accepted as the better method of treatment.

During the last two decades, vaginal hysterectomy has been reborn, and its performance in all gynecological services is now commonplace. Since it plays such an important role in gynecology, it is not likely to be again abandoned.

Originally, vesicovaginal fistulas were the result of the trauma of childbirth. With the increase of pelvic operations the so-called surgical fistulas now greatly outnumber the obstetric. The latter offer greater difficulty in closure. Two helpful adjuncts to the operation are the Schuchardt incision, and suprapubic cystostomy. Metal wire still has a place in the repair of vesicovaginal fistulas.

The current and useful method of cauterization of the cervix has resulted in the less frequent performance of trachelorrhaphy and amputation of the cervix.

A significant advance has been made in the surgical treatment of uterine prolapse, cystocele, and rectocele because of a better understanding of the structures that hold the pelvic viscera in their normal position. The supportive structures are exposed by layer dissection rather than by superficial dissection of the surface mucous membrane of the vagina. Better operative results have been secured. Uterine suspension and fixation have definitely decreased in frequency.

The treatment of pelvic inflammatory disease is more conservative. The sulfonamides are decreasing the incidence of this condition. Puerperal sepsis still heads the list of causes of maternal deaths in this country. Here again prophylactic measures are beneficial and the sulfonamide drugs are valuable.

Progress with ovarian tumors has been due to better classification and the recognition of certain of the rare ovarian new growths. There are no great differences of opinion as to the operative management of ovarian tumors. True neoplasms of the ovary should be removed surgically because of the danger of malignant degeneration. This should be done when the diagnosis has been established.

T. Floyd Bell, M.D.

OBSTETRICS

PREGNANCY AND ITS COMPLICATIONS

Herman, L., and Greene, L. B.: Pregnancy after Bilateral Ureteral Transplantation; Report of a Case after Bilateral Ureterocutaneous Transplantation. *J. Urol.*, Balt., 1944, 52: 300.

Very few pregnancies after ureteral transplantation have been reported, as might be anticipated from the comparative rarity of this operation and, what is equally important, the disinclination of women with serious physical defects to get married. Congenital malformations of the female genitalia which preclude either impregnation or successful gestation rarely occur in association with exstrophy or other maldevelopment of the bladder and contribute little to sterility in the type of case under discussion. Randall and Hardwick in 1934 found in the literature up to 1934, reports of 28 children born to 20 mothers with exstrophy of the bladder. Not all of the mothers had had ureterointestinal anastomoses. The literature since 1934 contains only 1 case report.

The deliveries in 21 of the 28 cases collected by Randall and Hardwick were normal and without unusual incident. It would seem that cesarean section is rarely necessary in women who have submitted to ureterointestinal anastomosis for exstrophy of the bladder.

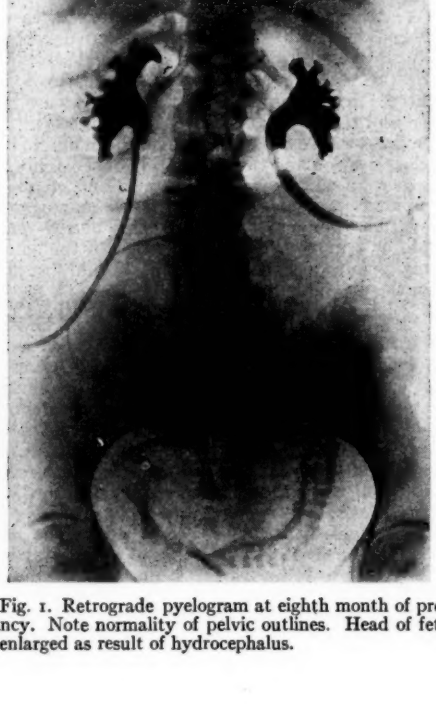

Fig. 1. Retrograde pyelogram at eighth month of pregnancy. Note normality of pelvic outlines. Head of fetus is enlarged as result of hydrocephalus.

Females with acquired urinary lesions requiring ureteral transplantations are often beyond the childbearing period or incapable of gestation because of the seriousness of the disease. The opportunities, therefore, for pregnancy following this operation are rare. The authors describe the case of a fully matured Polish girl, aged nineteen years, who had had a tumor (probably a meningocele) removed from the base of her spine at the age of six months. Her first admission to the urological department of the Pennsylvania Hospital was on July 19, 1939. She had never experienced the desire to void and had had constant dripping of the urine from the urethra, except on a few occasions when lying quietly on her right side or walking carefully; also there had been rectal incontenence when the bowel movements were liquid.

After numerous methods of treatment had been tried unsuccessfully, cutaneous ureterostomy was carried out. Several months after this she married and soon became pregnant. On February 9, 1944, at about the eighth month of pregnancy, she went into labor and was quickly delivered of a dead hydrocephalic infant. This obviated the necessity for cesarean section which had been anticipated as a means of preventing rectal and other possible injuries. Bilateral retrograde pyelograms made shortly before delivery illustrated the very satisfactory condition of the renal pelves which had escaped dilatation, including that incident to pregnancy. The kidneys were normal in function and only mildly infected.

DANIEL G. MORTON, M.D.

Finn, W. F.: Thrombocytopenic Purpura in Pregnancy. *Am. J. Obst.*, 1944, 48: 497.

Purpura hemorrhagica is at best a rare disease, but its coexistence with pregnancy is rarer still. The author gives in detail the classification, symptoms, diagnosis, and treatment of the disease. Three cases are reported in detail. The patient usually comes to the doctor complaining of bleeding from the mouth, epistaxis, or hematuria. The acute phase is more common in early life and the patient may progress to death from anemia or intracranial hemorrhage. The most striking physical sign is the presence of purpuric spots varying in size from the point of a pen to the head of a pin. Infection of the mouth with Vincent's organisms is a common association.

The treatment of thrombocytopenic purpura is both medical and surgical. In the acute phase, the patient is placed in bed, a high protein and high vitamin antianemic diet is given, and feosol is administered. Blood, citrated and fresh, or red-cell transfusions are given to control the bleeding, to keep the red-cell count above 2,000,000, and to keep the blood pressure above 90. Within the past year,

citrus pectin, in dosage of from 3 to 9 gm. a day, has been recommended by Isaacs. This checks the bleeding without affecting the platelet count. Either spontaneously or because of this therapy, the acute phase will subside. In this interval, foci of infection are removed or splenectomy is done. Splenectomy is contraindicated if there is any doubt of the diagnosis, if there is a history of recent drug ingestion, and, above all, if sternal puncture fails to reveal megakaryocytes in the bone marrow.

How is the child affected by the thrombocytopenic purpura of the mother? Mosher states that 50 per cent of the infants die in utero, or after delivery. Burnett and Klass, at the other extreme, believe that if the fetus develops purpura, it is not essential thrombocytopenic purpura but symptomatic purpura, or it is due to a familial platelet defect. Rushmore, in 1925, reported 7 instances in which purpura was present in both mother and child. The author adds 2 more examples of this, the first baby dying of congenital thrombocytopenic purpura, and the second living (also an example of congenital thrombocytopenic purpura). EDWARD L. CORNELL, M.D.

Jones, H. W., Jr., and Neill, W., Jr.: The Treatment of Carcinoma of the Cervix during Pregnancy. *Am. J. Obst.*, 1944, 48: 447.

In formulating a plan for a clinical situation as rare as the association of pregnancy and carcinoma of the cervix, one must draw upon the collective experience of the literature as well as upon one's own cases.

The authors believe that a general rule for the handling of these cases must take into account the obstetric and social background as expressed in the desire of the prospective parents for the child, as well as the extent of the disease. If there are other children, or if the parents do not care to assume the ever present risk of an abnormal child, they see no reason to advise any course except interruption of the pregnancy and adequate irradiation therapy.

The risk of an abnormal fetus cannot be statistically stated at the present time with certainty, but it seems probable that its upper limit is 20 per cent. If the parents and physician for any reason wish to assume this risk, it is justifiable to proceed with irradiation during pregnancy with a view to obtaining a living child at term. If the pregnancy is at the fifth month or beyond, the risk of an abnormal child is substantially less. The mother's prognosis is intimately related to the clinical extent of the disease. The general experience has been that most cases are discovered early and the prognosis has been parallel but somewhat poorer than for corresponding but uncomplicated groups.

If treatment during pregnancy with a view to obtaining a normal living child at term is decided upon, certain points in technique may be stressed. It is important that no high voltage roentgen-ray therapy be employed because of the obvious dangers of substantial depth dosage in the region of the developing child. The authors omit the use of tubes within the cervical canal. This is done for the twofold purpose of securing all possible distance from the baby and also to guard against the onset of labor by dilatation of the cervix. The entire treatment is carried out with tubes held in a cloth plaque against the cervix. The authors have preferred to use a large amount of radium for a correspondingly short period of time. In the 11 cases reported, the dose varied from 1,614 mc. hr. to 3,922 mc.

The prognosis of carcinoma diagnosed at term and treated by cesarean section plus panhysterectomy or irradiation, is grave. This is in a large measure due to failure of the attending physician to suspect the diagnosis and apply such simple clinical methods as speculum examination and biopsy, even in the presence of vaginal bleeding during pregnancy.

EDWARD L. CORNELL, M.D.

LABOR AND ITS COMPLICATIONS

Mackle, M. A.: Comparison between Surgical Induction of Labor by Means of the Rectal Tube and Surgical Induction of Labor by Artificial Rupture of the Membranes. Statistical Survey. *Med. J. Australia*, 1944, 2: 428.

In an endeavor to discover the more efficient method of surgical induction of labor, the author carried out a statistical survey of the results obtained by rectal tube induction and by artificial rupture of the membranes. Pregnancy had advanced to at least twenty-eight weeks in every case considered, and all cases in which either method was attempted have been included. During this period there were 278 cases of tubal induction and 393 cases of artificial rupture of the membranes.

Toxemia was the indication for induction in 88 per cent of the cases in which a rectal tube was used, and in 82 per cent of those in which induction was accomplished by artificial rupture of the membranes. Seven maternal deaths (a mortality rate of 2.5 per cent) followed tubal induction, while only 2 deaths (a mortality rate of 0.5 per cent) followed induction by artificial rupture of the membranes. Five of the deaths which followed tubal induction were due to infection; and the 2 others were due to obstetric shock after normal deliveries. The 2 deaths which followed artificial rupture of the membranes were due directly to the primary disease. The condition became morbid during the puerperium in 17.2 per cent of the patients in whom labor was induced by rectal tube, compared with this finding in but 13.5 per cent of those in whom labor was induced by artificial rupture of the membranes.

In this series, the total fetal mortality rate for tubal induction was 37.2 per cent, while the total fetal mortality rate for artificial rupture of the membranes was 19.2 per cent.

When the cases are divided into two groups—(1) those with less than thirty-four weeks of gestation and (2) those with thirty-four weeks of gestation or more—it is shown that in group 1 the fetal mortality rate was 70 per cent following tubal induction and

72 per cent following artificial rupture of the membranes; and in group 2 it was 23.4 per cent following tubal induction and 14.1 per cent following artificial rupture of the membranes.

The time from artificial rupture of the membranes to delivery was less than that from tubal induction to delivery in all groups. The average time from induction to delivery after the insertion of a rectal tube was forty-two hours, while that from artificial rupture of the membranes to delivery was twenty hours.

With regard to tubal induction, 5 inductions were unsuccessful, 1 patient being delivered by lower-segment cesarean section and 4 requiring subsequent artificial rupture of the membranes to induce labor. In 1 case prolapse of the umbilical cord occurred.

Artificial rupture of the membranes was unsuccessful in 2 cases and both patients were delivered by lower-segment cesarean section. Prolapse of the umbilical cord occurred 3 times.

This statistical survey indicates that the results of artificial rupture of the membranes are immeasurably superior to those of tubal induction.

DANIEL G. MORTON, M.D.

NEWBORN

Hennessy, J. P.: True Knots of the Umbilical Cord. *Am. J. Obst.*, 1944, 48: 528.

True knots of the umbilical cord are not infrequent and are occasionally of a complicated nature. They are usually harmless, since they are rarely pulled tightly enough in utero to obliterate completely the lumen of the vessels, or to cause the death of the fetus. They usually result from the active movement of the child.

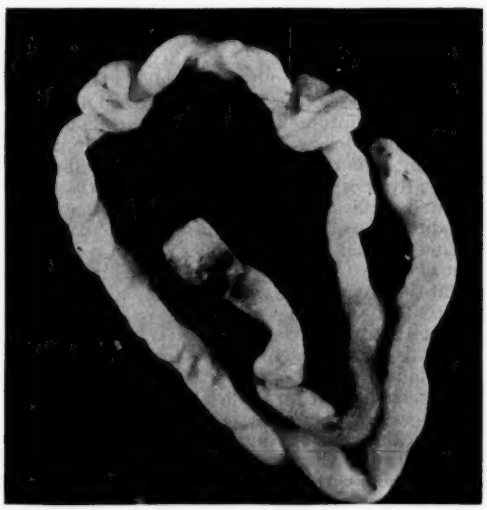

Fig. 1. True knots of the umbilical cord.

According to von Winckel, two conditions are necessary for their formation: a cord which in length exceeds twice the distance from the umbilicus to the vertex, and a small fetus or a large quantity of liquor amnii, which ensures mobility of the former. No doubt in many cases the knot remains open until labor begins, when the tension imparted to the cord by the descent of the fetus closes it. When the knot has been tightened during pregnancy, distortion of the cord will persist even after it has been untied because of the effect of the continued pressure on Wharton's jelly; but if it has formed only during delivery it can easily be straightened out. Although it is possible for the knot to become so tightly drawn as to cause a partial or complete obstruction of the cord circulation, this occurs very rarely.

Seven original cases are described, and a tabulation of 32 cases from the literature, supplementing the table published by Browne, is given. There were 2 antenatal deaths of the fetuses. In each case there was one true knot drawn tightly. In 2 other cases there were 2 true knots in the cord.

EDWARD L. CORNELL, M.D.

Anderson, N. A., and Nelson, W. E.: Clinical Observations in the Treatment of Epidemic Diarrhea of the Newborn. *J. Pediat.*, S. Louis, 1944, 25: 319.

A review of the literature on epidemic diarrhea of the newborn revealed an average fatality of 43 per cent. In this article the therapy of 28 cases of epidemic diarrhea is discussed.

In the early neonatal period the frequency and character of the stools is so variable that the diagnosis of epidemic diarrhea is often difficult. Unexplained diarrhea in any infant or diarrhea in 2 or more infants calls for isolation.

Twenty-eight of 76 term infants and 4 of 9 premature infants who were exposed developed the disease within a period of seven days. Twenty-eight of the 32 infected infants were treated. Seven were considered critically, 8 seriously, 8 moderately, and 5 mildly ill. One death occurred in a seventeen-day-old premature infant.

Stool cultures revealed only one organism of any possible significance. This was a para-aerogenes type of paracolon bacillus. Loss of weight was characteristic, most marked in the severe cases, and often preceded other clinical manifestations of the disease. Other clinical characteristics were general toxicity, diarrhea, and in the severe cases a low carbon-dioxide-combining power of the blood.

Treatment of these infants consisted of oral administration of a mixture of glucose and Ringer's solution, parenteral administration of additional fluids, correction of acidosis by the parenteral administration of alkali, oral administration of ascorbic acid and thiamine chloride, blood and plasma infusions as indicated, and, in addition, the administration of succinylsulfathiazole (1 gr. every four hours).

Acidosis was corrected by the administration of a 5 per cent solution of sodium bicarbonate or by the

intravenous and/or subcutaneous administration of M/6 sodium-lactate solution in calculated amounts. Clinical improvement was noted during or shortly after the administration of alkali. Oral feedings were gradually restored to normal as the infants improved.

In discussing the benefits of this therapy the authors pointed out the fact that control cases were impossible. However, the parenteral use of fluids was considered essential. The rapid improvement in acidotic infants after the administration of parenteral alkali impressed the authors in respect to this type of therapy. Succinylsulfathiazole had no noticeable effect on the disease.

JAMES F. DONNELLY, M.D.

MISCELLANEOUS

Lentz, J. W., Ingraham, N. R., Jr., Beerman, H., and Stokes, J. H.: Penicillin in the Prevention and Treatment of Congenital Syphilis. *J. Am. M. Ass.*, 1944, 126: 408.

Twelve pregnant women with early symptomatic syphilis and 2 with early latent syphilis, none of whom had previously received any type of antisyphilitic treatment, were given intramuscular injections of sodium penicillin at four-hour intervals, in doses of from 25,000 to 50,000 units, dissolved in 1 cc. of sterile saline solution, the course continuing for a period of approximately eight days, until a total dosage of from 1,200,000 to 2,500,000 Oxford units had been given. In 9 infants with early congenital syphilis, neither they nor their mothers having received other antisyphilitics, the same technique of treatment was used for the same period of time, with the difference that the individual doses were so regulated that in 4 cases the total injections ranged between 16,000 and 19,000 units, and the remaining 3 dosages were 2,935; 10,631; and 11,111 units per pound of body weight, respectively. Two of the 9 children died prior to completion of the treatment; these deaths, however, were not ascribed to the penicillin.

All 14 pregnancies are included in this report merely to show that the higher dosages are well tolerated by the pregnant women, and that apparently the highest amount (2,400,000 Oxford units) should be used when the physical condition is satisfactory. Seven of the 14 women (6 with early initially symptomatic syphilis, and 1 with early latent syphilis) have so far delivered, and these cases are reported in some detail. None of these 7 women started penicillin prior to the midterm period of their pregnancies, and none had attained seronegativity at term; yet all the infants seemed healthy, 4 were seronegative at birth, and 3 became negative in less than a month postpartum and have remained so for short periods of observation. Roentgenograms of the long bones of 4 of the infants were taken, both at birth and at the age of six weeks or later; in each instance they were normal.

Three of the infants with early congenital syphilis have been followed up long enough to make a report possible (ninety-nine, ninety-seven and seventy-nine days, respectively, after administration of the sodium penicillin). All 3 infants had relatively high blood serologic titers initially, but these dropped sharply to normal in 1, and to relatively low levels in the 2 others (½ unit and 8 units, respectively); all became clinically normal to physical examination. The 2 infants who showed definite roentgenographic changes of syphilitic osteochrondritis and periostitis have resumed approximately normal bone development.

In conclusion the authors urge caution in initiation of the penicillin treatment because of the Herxheimer reaction, just as in other antisyphilitic medication.

JOHN W. BRENNAN, M.D.

GENITOURINARY SURGERY

ADRENAL, KIDNEY, AND URETER

Colby, F. H.: Renal Complications of Reiter's Disease. *J. Urol.*, Balt., 1944, 52: 415.

The author's review of 3 cases gives the essential features of the syndrome known as Reiter's disease. All 3 cases occurred in young males. The typical triad of urethritis, conjunctivitis, and arthritis was present. There was insufficient evidence to show that the disease was contracted by sexual exposure. Bacteriology has failed to identify the causative agent. The course of the disease is unaffected by any known therapy, including penicillin. Instances of permanent joint disability are rare although a few are reported. Recurrent eye, joint, and urinary symptoms may occur and severe renal complications may be encountered. JOHN A. LOEF, M.D.

BLADDER, URETHRA, AND PENIS

Donaldson, S. W., and Ratliff, R. K.: Extravesical Lesions Causing Bladder-Neck Obstruction. *Radiology*, 1944, 43: 319.

The authors comment upon the lack of reports of bladder-neck obstruction due to extravesical causes. During the past two years there have been 5 cases of this type treated by the authors. Three women had complete urinary retention due to fibroids of the uterus, associated with uterine ptosis in 2 cases. Recovery was complete in these cases following hysterectomy. One male who had a sacral chordoma which caused vesical-neck obstruction was given a permanent suprapubic cystotomy, and a male who had a sarcoma of the pelvis which caused acute retention of the urine died in the hospital.

It is believed that extravesical lesions causing obstruction at the bladder neck should offer little difficulty in diagnosis. They should be suspected if the cystoscopic examination is negative in the presence of a pelvic mass which persists after the bladder is emptied. The extravesical tumors usually do not cause the rectal symptoms and venous stasis which accompany most retroperitoneal tumors, and for that reason the diagnosis of such lesions may be arrived at by the process of elimination. Careful pelvic and rectal examinations together with cystograms usually establish the diagnosis.

Osteomyelitis with soft-tissue abscess has been observed to cause bladder distortion but never obstruction. Fractures of the pelvis cause obstruction by contusion or rupture rather than by pressure. Lesions of the lower bowel involving the rectum, even though far advanced, rarely cause vesical-neck obstruction. This is probably due to the mobility of the gut and to the pelvic fascia, which serves as an effective barrier.

Treatment in cases of bladder-neck obstruction should be instituted in order to relieve the obstruction and to restore the urinary organs to as near normal function as possible. Early treatment is indicated in order that kidney damage may not become so severe that it cannot be remedied. The blood urea and renal function should be determined.

Cystograms of excellent diagnostic value are reproduced in the original article.

DONALD F. MCDONALD, M.D.

GENITAL ORGANS

Frame, E. G., and Jewett, H. J.: The Excretion of 17-Ketosteroids in Carcinoma of the Prostate; Personal Experiences. *J. Urol.*, Balt., 1944, 52: 330.

The total excretion of urinary 17-ketosteroids has been determined in 16 cases of carcinoma of the prostate and compared with that of 8 controls in a similar age group. Five of the patients with carcinoma had been castrated from ten to twenty-four months previously. In all cases the total 17-ketosteroids were separated into alpha and beta fractions, since the literature contains suggestions that such separations may be of clinical importance.

The results indicate that the total 17-ketosteroid excretion in older men is less than in men between the ages of twenty and forty, but the amount in cases of carcinoma of the prostate does not differ from that in control cases of a similar age group. There also is no significant difference in the relative amounts of alpha and beta fractions present in the patients with and without carcinoma of the prostate. The patients with carcinoma of the prostate who had been castrated from ten to twenty-four months previously and in whom there had been a recrudescence of the disease, showed no difference in 17-ketosteroid excretion from that in the untreated cases. JOHN A. LOEF, M.D.

Donahue, C. D.: The Use of Stilbestrol in Carcinoma of the Prostate. *Northwest M.*, 1944, 43: 284.

At present the use of stilbestrol is rather empiric. Yet there is a fairly sound basis that justifies its employment. The interrelationship of the pituitary, thyroid, adrenal, prostate, and testicular glands is common knowledge. If there is an imbalance created in this interrelationship, tissue growth is thrown out of balance.

Orchectomy has definitely proved its value in malignant growths of the prostate, yet there are instances in which no improvement was noted. This is in part explained by Herbst's autopsy reports, in which he cited enlargement of the adrenal glands to four and seven times the normal size. This occurred in 1 patient who failed to respond to castration. Undoubtedly, the pituitary gland was playing an important part in androgen control. It is the

author's belief that variability in response to the castration method may be explained by the close interrelationship between the endocrine functions.

He does not think that stilbestrol has been given a fair trial by some, especially when he reads that 1-mgm. doses by mouth have been given with unsatisfactory results.

More than 40 cases are under treatment at the present time. In consideration of the dosage the author has become more bold and followed the course of others in administering 40 intragluteal injections, 5 mgm. each, a total of 200 mgm., and then a maintenance dose of 1 mgm. each night on retiring. Patients are required to call at irregular intervals for recheck and repeat with a second course if necessary.

The largest total dosage was 1,440 mgm. given over a three-and-one-half-year period. There has been no unfavorable reaction.

As far as maintenance dosage is concerned, the author is not certain that 1 mgm. doses are sufficient.

As to toxic effects, only 1 case seemed to be definitely reacting to stilbestrol with nausea and vomiting, which prompted the discontinuance of the treatment. Other side-effects were minor, namely, swollen breasts and sore nipples.

JOHN A. LOEF, M.D.

Marshall, V. F.: Subtotal Perineal Prostatectomy: Presentation of a New Technique. *J. Urol.*, Balt., 1944, 52: 250.

The perineal approach for prostatectomy is an established urological procedure.

Four advantages of subtotal perineal prostatectomy, i.e., the removal of almost all or all of the capsule but with retention of most of the bladder neck, over perineal intracapsular enucleation seem noteworthy:

1. An unrecognized carcinoma may be removed.
2. Many fibrotic, infected, or stone-bearing prostates are best treated by this procedure.
3. Hemorrhage is well controlled under vision.
4. Subsequent urinary control compares favorably with that following other methods.

The approach for subtotal perineal prostatectomy follows Young's classical description and need not be described here. Occasionally, Belt's modification is used, but the exposure is not quite so good.

After the rectal surface of the prostate is exposed, biopsies are taken from any suspicious areas and frozen sections made. If carcinoma is present Young's radical operation is done. The fascia overlying the seminal vesicles and ampullae is incised transversally and the lower portions of these organs are well exposed. These lower portions may now be divided distal to right-angle clamps (so-called gallbladder clamps) and the stumps transfixed with "0" chromic catgut, but it is usually easier to do this later. When desired the vesicles and ampullae may be dissected free and removed *in toto*. Then the tissues on the sides of the prostate are pushed upward by blunt dissection with the handle of the scalpel so that all loose tissue is crowded into the region of the anterior commissure. An incision is next made two-thirds of the way around the lower circumference of the urethra at the junction of the apex of the prostate and membranous urethra, care being taken to avoid the external sphincter region. When necessary a cystoscope can now be passed for examination of the bladder. One blade of a heavy curved scissors is inserted into the urethra and placed in the groove between the upper part of the lateral lobe and the anterior commissure. The other blade is in a corresponding position outside of the whole thickness of prostate superiorly and in the space previously created by blunt dissection. An incision is now made back to the muscle of the bladder neck and the step repeated on the other side. By palpation the more or less vertical groove on either side between the lateral lobes and the bladder on the interior of the bladder outlet is found and with the scissors the upper halves of the lateral lobes are excised from the bladder. A few bleeding vessels are usually found on the cut surface of the bladder muscle and these are clamped and ligated with "00" plain catgut. Prostatic lobe forceps are applied to the lateral lobes, occasionally only one at a time to allow more room. The lobes are pulled downward and rotated laterally, the prostatic urethra being spread open to give a clear view into the bladder and of the remaining sites to be divided. The incision between the lateral lobes and the bladder is continued downward almost to the trigone, any bleeding vessels being ligated in course. The whole prostate is turned sharply downward and traction applied; this provides a complete view of the trigone. If the middle lobe is up under the trigone, an incision with the scalpel is made across the apex of the trigone and down to the prostatic tissue, the middle lobe is enucleated from its connections with the bladder and the flap of the trigone raised bluntly, which exposes the vesicles, ampullae, and chief vascular supply of the prostate; these are clamped, cut, and ligated to remove the prostate. If the gland has not enlarged under the trigone this is usually not necessary and right angle clamps can be applied and the gland removed. The clamped tissue is transfixed with sutures of "0" chromic catgut.

The closure is proceeded with in the following fashion:

Chromic "0" catgut is used for suture material. A mattress suture is placed in the roof of the bladder neck and the roof of the urethra and tied, the strip of mucosa on the anterior commissure being ignored. This approximates the top of the new outlet. A similar suture is placed through the apex of the trigone, including the bladder-neck musculature beneath it, and into the floor of the urethral stump. This approximates the floor of the new outlet and leaves the excess opening into the bladder on either side. A 30-cc. Foley bag catheter (usually size 22 or 24 French) is inserted through the urethra into the bladder and inflated. The bladder is thoroughly irrigated before complete closure. The openings on either side are now closed transversally with in-

terrupted single sutures through all the layers of the bladder wall. At a suitable point on either side, one of these sutures also passes through the lateral wall of the urethra. Considerable care is taken that the sutures are tied only tightly enough to approximate the tissues so that there will be no necrosis. The closure should be watertight to moderate irrigation, and, if not, a few extra sutures may be placed at the required points. The wound is irrigated, and if appreciable infection is expected about 1 gm. of sulfonamide powder is dusted in it. One thin rubber tissue drain is inserted to the suture line. The levator muscles are loosely approximated with interrupted single catgut sutures, the subcutaneous tissue with "0" plain catgut, and the skin with fine silk. The drain is brought out one angle of the wound and sutured to the skin with silk.

JOHN A. LOEF, M.D.

MISCELLANEOUS

Heller, C. G., and Myers, G. B.: The Male Climacteric; Its Symptomatology, Diagnosis, and Treatment. *J. Am. M. Ass.*, 1944, 126: 472.

The authors point out the subjective similarity of the male climacteric, psychoneurosis, and psychogenic impotence. Because of this fact it is undertaken to distinguish these conditions by laboratory tests and to determine if the male climacteric is a normal accompaniment of the aging process or a pathological condition. Further, the therapeutic value of hormones is investigated.

Since it is known that in the female the menopause is accompanied by an elevation of the gonadotropin titer, an investigation was undertaken to show whether or not such elevation is a true index of testicular failure.

Twenty-five normal men in the age group from the third to the 10th decade were subjected to the gonadotropic content of twelve-hour night urine. The ovarian weights of the injected white rats averaged 12.3 mgm., which finding was similar to that in the injected control rats.

In the cases of 12 castrated men the ovarian weight was increased fivefold (58 mgm.), which is to be interpreted as testicular failure. The urinary gonadotropic elevation was further revealed in 8 prepubertal castrates. Again the gonadotropin increase was revealed in 20 cases by hyalinization of the seminiferous tubules and clumping of the Leydig cells.

Urinary gonadotropic assays in 38 men complaining of symptoms similar to the female menopause demonstrated two distinct categories: (1) 15 patients with normal gonadotropic assays, and (2) 23 individuals in which the hormone was decidedly elevated, which suggested a lack of testicular function, and this was confirmed by histological examination of biopsy specimens in 8 individuals.

Testosterone propionate was exhibited in 29 of these patients, 9 of group 1 and 20 of group 2. The 20 patients in the last group were subjectively improved in one week, and 17 were completely relieved at the end of three weeks, but the remaining 3 continued to have psychic and constitutional symptoms in spite of therapy for several months after which vasomotor and urinary symptoms were abolished. In 2 cases the loss of sexual vigor was refractory to therapy until 50 mgm. of testosterone propionate was given five times weekly. In 14 cases the therapy was withheld and all symptoms including sexual impotency returned, and this was again reversed by the exhibition of testosterone propionate. None of the patients demonstrated improvement when placebos were substituted for the hormone without the patient's knowledge. The subjective improvement, followed by return to the original symptoms, failure of the placebos to afford subjective relief, and, finally, improvement with re-establishment of therapy are demonstrated by the concomitant curve of urinary gonadotropic assays.

In reviewing the symptomatology the authors noted similar symptoms in the groups except that in the former group there were distinct hot flashes while in the latter the symptoms were present, more or less, throughout life with the onset following psychic trauma.

It was concluded that the male climacteric may occur as early as the third decade (1 case reported was that of a twenty-five-year-old man); but it is a relatively rare syndrome, probably affecting only a small proportion of men who live into old age, and therefore, distinctly a pathological process.

Androgen therapy is contraindicated in: (1) the presence of carcinoma any place in the body, (2) the presence of edema, since androgen tends to produce sodium and, thus, water retention, and (3) the presence of normal testes, since testosterone inhibits spermatogenesis and disuse atrophy of the Leydig cells.

The authors advise a therapeutic test for the male climacteric in instances in which laboratory facilities are not available. Testosterone propionate (25 mgm.) is given intramuscularly five days weekly for two weeks. If there is no subjective improvement or a return of sexual potency two conclusions are permissible: (1) that the patient does not have the male climacteric, or (2) that excessive dosage of testosterone is necessary, which makes the therapy impractical. On the other hand, if the patient responds it is then essential to determine if he is suffering from testicular inadequacy, and this is accomplished by discontinuation of the therapy with a return of symptoms, symptomatic continuation with placebos, and, finally, further androgen treatment with relief of the symptoms again.

It was the finding of the authors that complete testicular failure can be usually controlled with 25 mgm. of testosterone propionate given thrice weekly, in some cases given once weekly, and rarely with 10 mgm. given once or twice weekly. Implantation of pellets is advocated in instances in which two or more intramuscular injections of testosterone propionate are necessary weekly. From 4 to 8 pellets

are implanted subcutaneously in the thighs and provide control for periods of from six to ten months. Methyl testosterone has been found to be disappointing as a means of replacement therapy and, moreover, it is toxic in large doses.

ROBERT LICH, JR., M.D.

Trattner, H. R., and Walzak, B. J.: Studies Concerning Effects of Calcium on the Urinary Tract. *J. Urol.*, Balt., 1944, 52: 357.

Effects following the intravenous injection of 10 cc. of a 10 per cent solution of calcium gluconate on the musculature of the renal pelvis and calyces, ureter, and bladder were studied by four different methods in a total of 282 patients.

The injected calcium did not alter spastic states, which included spasm of the renal pelves and calyces in 17 per cent, of the ureter in from 17 to 71 per cent, and of the bladder in 30 per cent of the patients. There was persistence of pain in 30 per cent of the patients having ureteral colic. No notations of urinary *p*H were recorded.

Excluding instances of slight to moderate relaxation, the injected calcium was found to produce a marked relaxation, which overcame a previously existing spastic state in 30 per cent of the renal pelves and calyces, in 27 per cent of the ureters, and in 57 per cent of the bladders. Forty per cent of the patients having ureteral colic experienced complete relief from pain. No notations of urinary *p*H were recorded.

When relaxation followed calcium injection, defects which had appeared in the urogram, because of contracted or spastic states, disappeared. This finding proved to be of important assistance in urographic interpretation. It was also observed that a greater amount of opaque solution could be tolerated by a patient with minimal or complete absence of pain.

From bladder-filling determinations before and after calcium injection, it was found that the urinary *p*H has an important and very definite relation to calcium action in that relaxation of the bladder occurred in a greater degree with and greater frequency on the acid side, particularly between *p*H 5.0 and 6.3, while diminution in capacity of the bladder, i.e., increased tone or spasm, took place to a greater extent and with more frequency on the alkaline side. Thus there appears to be an optimal acidity of the urine in which the antispasmodic or relaxing effect of the calcium is more likely to take place.

The injection of calcium for the purpose of relaxation is contraindicated when the urine is alkaline because of decreased effectiveness, negative results, or reversal of action. There is less certainty of relaxation when the urine is of high acidity than when it is within the optimal acid range.

The incidence of relaxation should be expected to occur in a greater percentage of cases than is reported in this article if calcium is injected when the urine is in the optimal acid range indicated, or if the patients are properly acidified prior to such administration.

JOHN A. LOEF, M.D.

SURGERY OF THE BONES, JOINTS, MUSCLES, TENDONS

CONDITIONS OF THE BONES, JOINTS, MUSCLES, TENDONS, ETC.

Helfet, A. J.: Acute Manifestations of Yaws of the Bones and Joints. *J. Bone Surg.*, 1944, 26: 672.

In the tropics yaws is the most common bone and joint disease. It is very often associated with tropical ulcers and cracked, painful skin especially on the feet. The manifestations of yaws are so similar to syphilis that differentiation often becomes very difficult. It is said that yaws does not affect the viscera and the central nervous system. The symptoms of syphilis are characterized by "bone pain," especially at night and when the limb is warm and dependent. This is associated with the picture of bone sclerosis. Patients affected with yaws present a more rapid and painful picture.

The history is rarely older than a few weeks and already definite, characteristic features are seen on the roentgenogram. There are single or multiple "punched out" areas, subperiosteal necrosis of bone with raising of the periosteum and deposition of new bone, which often takes the shape of "onion-layering."

Yaws near joints may simulate arthritis, as it causes pain, swelling, muscle spasm, and limitation of motion. Syphilitic gummatous lesions rarely show these clinical manifestations. Yaws in the shaft of long bones frequently resembles septic osteomyelitis. The disease is found in any part of the skeleton. The tibia, lower end of the femur, medial end of the clavicle, and lower end of the humerus are predominantly involved. The Wassermann and Kahn reactions are always positive.

The microscopic picture of yaws is very similar to that in syphilitic lesions, with the exception that endarteritis obliterans—which is so characteristic in syphilis—is absent in yaws. The joints and tendon sheaths are very often affected by this disease. In joints, yaws produces a painless chronic synovitis. Articular cartilage is not affected. When the tendons are affected the formation of ganglia or tenosynovitis is very common.

Arsenicals are used in antiyaws treatment. The author used acetylarsan or novarsenobillon (N.A.B.) or alternate doses of bismostab and sulfostab. Under this treatment subjective complaints disappear readily. The objective findings, however, subside very slowly.

The author states that his investigations on yaws in Africans in Africa were hampered by two facts. The African has little appreciation of time, and, therefore, the past and present history was unreliable. Also, he is very often affected by a multiplicity of diseases which obscure the clinical picture considerably. The most common diseases were chronic malaria, dysentery (entamoeba hystolitica), and helminthiasis.

GEORGE I. REISS, M.D.

Boyd, H. B.: Congenital Talonavicular Synostosis. *J. Bone Surg.*, 1944, 26: 682.

The author reports 4 additional cases of talonavicular synostosis, a condition previously described as being unusual and very rare.

A white girl of ten years, a white boy of ten years, the boy's father, aged forty-five, and the boy's grandmother, aged seventy-two—all presented talonavicular synostosis. They had very little or no complaints.

The author points out that the relationships of the last 3 patients suggest a hereditary nature of the condition.

A number of x-ray reproductions show the fusion of the talus and the navicular bone very distinctly.

GEORGE I. REISS, M.D.

SURGERY OF THE BONES, JOINTS, MUSCLES, TENDONS, ETC.

King, B. B.: Lantzounis Periosteocapsuloplasty for Congenital Dorsal Subluxation or Congenital Overlap of the Fifth Toe. *South. M. J.*, 1944, 37: 614.

Simple amputation of the fifth toe for congenital overlap or subluxation has not eradicated the pressure symptoms about the planterolateral aspect of the fifth metatarsal head which recur postoperatively. A new technique is herewith reported. Eighteen such fifth toes have been corrected by an operation called periosteocapsuloplasty (Lantizounis) in 11 soldiers with satisfactory results. All of the patients complained that the involved fifth toe rubbed on their shoes and uniformly exhibited dorsal clavi.

The operative procedure is described in detail and is accompanied by two diagrams, one of which is herewith reproduced.

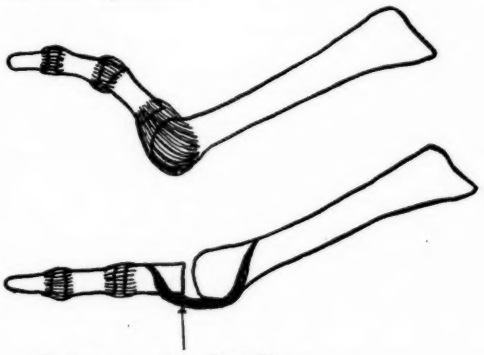

Fig. 1. a, top, Diagrams lateral view of fifth toe and metatarsal before operation. b, Diagrams lateral view of correction obtained by operation.

After the fifth metatarsophalangeal joint is exposed, the extensor digitorum longus tendon is cut from its distal insertion and transplanted onto the fifth metatarsal neck. The dorsal periosteocapsuloperiosteal layer covering the fifth metatarsophalangeal joint is reflected mediolaterally. This, in addition to the tendon transplantation, augments release of the "bow-string" with complete reduction of the existing subluxation deformity. A mattress suture of the reflected capsuloperiosteal layer introduced under the metatarsophalangeal joint not only reverses the "bow-string" but maintains it. When this suture is tied no intervening tissue remains between the bony structures and the skin. The redundant capsular element is now transfixed under the fifth metatarsophalangeal joint. The skin is closed in the usual manner. Copious dressing and adhesive are the only immobilization used. The author recommends weightbearing three weeks postoperatively. SAMUEL L. GOVERNALE, M.D.

FRACTURES AND DISLOCATIONS

Allende, G., and Freytes, M.: Old Dislocation of the Elbow. *J. Bone Surg.*, 1944, 26: 691.

During the past ten years, the authors have treated 35 patients with old dislocations of the elbow who presented themselves for consultation from twenty days to five months after their injuries. If a dislocation is not reduced immediately, osseous and fibrous changes occur around and in the elbow joint, which make manual reduction impossible.

Fractures were associated with the dislocation in 13 of the cases in this series: fracture of the medial epicondyle in 8 cases, of the tip of the coronoid process in 3 cases, of the lateral epicondyle in 1 case, and of the lateral condyle in 1 case. Fracture of the head of the radius has never been found in old dislocations.

Ossification of the posterior and anterior aspect of the inferior extremity of the humerus, scar formation in the olecranon fossa, and shortening of the triceps were the outstanding pathological changes observed in these elbow joints.

Operative reduction of the dislocations was performed in all cases. The patient was placed face down on the table, and an incision was made on the posterior aspect of the elbow joint. The shape and size of the incision varied. The ulnar nerve was located, freed, and retracted. The triceps was severed following an inverted U-line. The ends were retracted proximally and distally and to both sides until the radius became visible laterally, and the humerus became visible medially. The joint was opened by flexing the arm. Fibrous tissue and ossification were removed. The ends of the triceps muscle were sutured with catgut or No. 34 stainless steel wire. The ulnar nerve was replaced. The skin was sutured. A plaster-of-Paris cast was applied from the axilla to the metacarpophalangeal joints, the elbow being kept at an angle of 140 degrees in the cases with stable reduction, and at an angle of 90 degrees in cases in which a tendency toward redislocation was noted.

In from eight to ten days after the operation the cast was opened. Exercises and hot salt baths were given and the arm was replaced into the cast after each treatment. This was done for a period of one month.

Functional results are described as being satisfactory. The elbow was painless and stable, with a range of movement that varied between 40 and 120 degrees in the various patients discussed.

Other methods of treatment of old dislocation of the elbow were discussed. Farabeuf recommended, in dislocations less than four or five months old, the use of strong traction by flexing and extending the arm, and then pronating and supinating it, with the object of breaking down adhesions and facilitating later manipulative reduction. Watson-Jones recommended in some cases the use of Thoma's "sham" reduction which consists in flexing the elbow at a right angle and keeping it so in a sling for three weeks, after which the patient forms a nearthrosis by active movement. Arthroplasty was very successful in the hands of Putti and Serra.

The authors finally discuss the indications for 3 surgical approaches: the posterolateral approach of Kocher, the transolecranal approach in which vitallium screws are used to approximate the separated fragments, and the transtendinous approach.

GEORGE I. REISS, M.D.

Ponseti, I.: Causes of Failure in the Treatment of Congenital Dislocation of the Hip. *J. Bone Surg.*, 1944, 26: 775.

A study has been made of 129 patients with congenital dislocation of the hip, with the object of determining the causes of failure in the treatment of this condition.

The cases were divided into the following three groups:

Prenatal dislocations, in which the dislocation is present at birth.

Postnatal dislocations, in which the patient presents a predislocation at birth, which slowly pro-

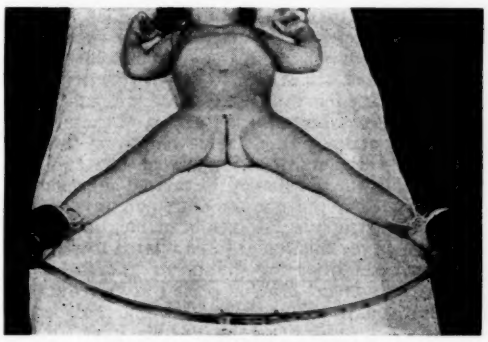

Fig. 1. Abduction bar applied.

Fig. 2. a, left, Outward rotation of the foot is locked at 75 degrees; b, There is free inward rotation.

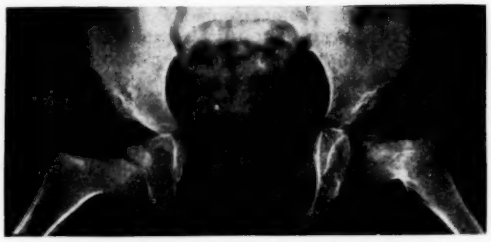

Fig. 3. With the abduction splint applied, the femoral heads are centrally situated in the acetabulum.

gresses during the first year of life until it becomes a well established dislocation when the patient begins to walk. The "bilabiation" of the acetabular roof shown on the roentgenogram is characteristic of most of these cases.

Doubtful cases, in which both the primary and secondary acetabula are well developed, but in which the roentgenogram shows them to be separated by a bony ridge. In these cases, it was impossible to determine how and when the dislocation took place.

Treatment in the prenatal cases generally resulted in failure. Putti's abduction splint is indicated only during the predislocation stage of the postnatal dislocations.

The anteversion of the femoral neck plays an important role in the maldevelopment of the hip after immobilization.

Except for the prenatal dislocations and a few dubious and postnatal cases, which could not be reduced, the greatest number of failures in the treatment of congenital dislocation of the hip is to be found:

1. In epiphysitis of the femoral head
2. When there is a tendency of the head to become subluxated, which occurs at the beginning of the walking exercises
3. In osteosclerosis of the acetabular roof

If better results are to be obtained in the treatment of congenital dislocated hips, we shall have to direct our efforts to diminishing the incidence of epiphysitis and to establishing a careful and prolonged after-treatment to favor the development of the acetabular roof. It was noted how frequently cystic atrophy of the femoral epiphysis occurs, and that a flattened head results in 50 per cent of these cases. The cystic atrophy starts to develop from the fifth to the seventh month of immobilization, and progresses until the removal of the cast. The longer the immobilization, the greater and more frequent is the cystic atrophy. As has been mentioned, the author believes this lesion to be related to the poor biological condition of the primary acetabulum, where the femoral head is placed after reduction. The best conditions for the head will be provided by an early development of the new hip joint with all its components, but mainly the development of the synovial lining. In a baby, a good part of the femoral head is cartilaginous, and we know how much the nutrition of the cartilage depends upon the synovial fluid.

It seems logical that a joint, which is the main organ of motion, will develop better with motion than with rest. The retention of the head in the primary acetabulum should be the principal aim of treatment during the first months after reduction. As soon as the danger of redislocation has disappeared, the rebuilding of the new hip joint will be better accomplished by the establishment of controlled motion.

From the study of this series, it has been learned that the persistence of the Trendelenburg sign for more than two or three months after the patient has begun to walk indicates a poor prognosis. If the glutei do not recover and a positive Trendelenburg sign persists, the femoral head is subluxated on each step, because of the tilting of the pelvis, and the reconstruction of a good acetabular roof becomes impossible.

It has been said by different authors, and mainly by Krida and Badgley in this country, that one of the main causes of dislocation is the anteversion of the femoral head. Because of this anteversion it is necessary that the leg be maintained in inward rotation to obtain centralization of the femoral head in the acetabulum, and outward rotation should be avoided for a long period after treatment. The best way to accomplish this would be to strengthen the inward rotators of the hip which have been weakened during the period of immobilization.

The authors believe the postreduction treatment of the congenitally dislocated hip should be directed as follows:

1. Functional treatment should be started as early as possible to avoid or diminish epiphysitis of the reduced hip.
2. Prolonged, controlled, functional treatment with the legs in abduction, should be carried out in order to secure the central position of the femoral head in the acetabulum, and to make possible a good development of the acetabular roof. Outward rotation of the legs should be avoided, but free inward rotation should be allowed, in order to stimulate the development of the inward rotators.

One year ago the authors began to treat a group of congenitally dislocated hips in the following way:

1. The reduction of the hip is done following Ridlon's technique—the method which has been used in the State University of Iowa Hospitals for many years.

2. A well molded, bilateral, plaster hip spica is applied with the hip in 90 degrees of flexion and from 60 to 70 degrees of abduction, in both unilateral and bilateral dislocations. This position is recommended by Waldenstrom in order to avoid overstrain on the adductors which "press the femoral head with great force against the acetabulum and the anterior part of the capsule." If the reduction is stable, the knee joints can be left free. If the head redislocates easily, the plaster cast must be extended below the knees. This position is maintained for from three to four months; and then, under anesthesia, the legs are brought to Lange's position with as much inward rotation as possible. A bilateral, long leg-hip spica is applied for two additional months.

3. Following the five or six months of immobilization, the controlled functional treatment is begun. With the object of (a) keeping the legs in abduction, (b) avoiding the outward rotation of the legs, and (c) giving them free motion in other directions, an abduction bar was devised. This splint consists of an iron bar with a plate inserted on each end. The plates, which are attached to the heels of the baby's shoes, have free inward rotation, while the outward rotation is locked at 75 degrees. The distance between these two plates can be controlled by sliding the two pieces which form the bar. The legs should form an angle of 100 to 120 degrees.

This abduction bar is kept on the patient continuously, except for the daily bath, from two to six months following removal of the cast. At the end of two to six months, according to the development of the hip joint, the child is allowed to walk for two hours daily for the next month. The splint remains applied for the rest of the day. The length of time the patient can walk each day can be determined from successive roentgenograms, but probably during the first year after reduction daily walking should not exceed from two to six hours. The splint must be applied at night for at least three years following reduction, even if the roentgenogram shows a well developed hip. We are dealing with a congenital deformity which has a strong tendency to persist.

The author's observations on open reduction and shelf operations are as follows:

Open operation proved to be useful in several of the older cases, in which an hour-glass constriction of the capsule, a too-long round ligament, or adhesions of the capsule to the wall of the iliac bone were the causes of the irreducibility. The hour-glass constrictions and the adhesions of the capsule were late sequelae of old congenital dislocations. In no patient under four years of age were such conditions found, and consequently the author concludes that open operation is rarely indicated in young children. The shelf operation was successful only in the cases in which the femoral head could be well placed in the center of the acetabulum. The shelf with the head above the primary acetabulum gave a poor functional result. ROBERT P. MONTGOMERY, M.D.

Savini, C.: Ambulatory Treatment of Fractures of the Lower Extremities. *Am. J. Surg.*, 1944, 66: 44.

In the ambulatory treatment of fractures of the lower extremities, after the fracture has been reduced and the limb immobilized, the patient should be allowed to leave the bed as soon as possible. Getting out of bed is the first and most important part of the treatment. Walking is of secondary importance, and should be left for a later time and mostly to the discretion of the patient.

To be out of bed insures better nutrition, better digestion, a better general condition, and, as a consequence, better healing of the fracture.

Patients should not be urged to walk too soon. Generally, they are too eager to walk. However, once they have acquired confidence, without any instruction, encouragement, or assistance, they generally move around and walk within a very short time.

An ambulatory treatment is seldom possible when the fracture was treated with open reduction,

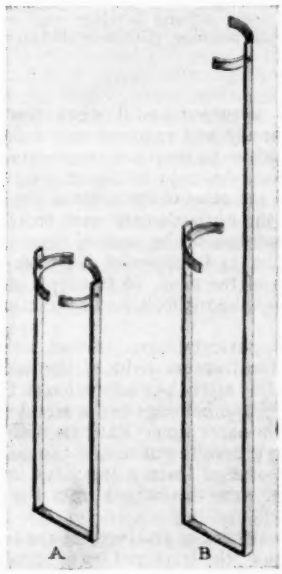

Fig. 1. Models of stirrups: A, for fracture of leg; B, for fracture of hip joint. Each stirrup is made with duralumin $\frac{1}{2}$ inch wide and $\frac{1}{8}$ inch thick. Two plates of pliable metal are attached to the top branches of the stirrup serving to hold the stirrup on the ring of the bandage covering the leg. The bases of the stirrups touching the ground are covered with rubber.

Fig. 2. Apparatus for fracture of hip complete; weight 5 pounds. Plaster-of-Paris bandage was removed from the leg to permit massage. (Courtesy of American Journal of Surgery.)

but it was very successful when fractures were treated manually and required only a light plaster-of-Paris bandage to keep the fragments in place.

From January 1, 1933 to December 31, 1942, 148 of a total of 232 cases of fractures of the lower limbs referred to the author's care were treated ambulatorily: 10 fractures of the neck of femur, 5 fractures of the patella, 23 fractures of the tibia and fibula, 20 fractures of the tibia, 16 fractures of the fibula, 49 fractures of the malleoli, and 25 fractures of bones of the foot.

All these patients were treated as emergency cases, and the fracture reduced immediately or as soon as possible after their admission to the hospital. A plaster-of-Paris bandage and a metal stirrup were applied at the same time. Patients with fracture of the leg were generally out of bed the next day after admission, some of them a few days later and, on the average, were discharged from the hospital in one month.

In the treatment of fractures of the leg and foot, after reduction, the fractured leg is immobilized and at the level of the tuberosity of the tibia, a length of plaster-of-Paris bandage is applied sideways and rolled around the leg to form a 1-inch wide and 1-inch thick ring as a part of the plaster-of-Paris covering the leg, to serve as a good support to the metal stirrup. The stirrup is longer than the leg so that when the patient is standing, it rests on the floor, the foot remaining suspended and not touching the floor. Thus walking is made easy and there is no danger of traumatic flat foot.

For fractures of the hip joint, the treatment is as follows:

Following reduction and after a light bandage of plaster-of-Paris has been applied on the whole limb, another stirrup is used, the external branch of which is made long enough to measure the distance from a little below the crest of the iliac bone to the floor, and its internal branch to reach the middle part of the thigh of the patient. To support the stirrup, the plaster-of-Paris bandage covering the entire limb is reinforced with two rings, one just below the crest of the iliac bone, circling the lower part of the abdomen, and the other at the middle part of the thigh. When the stirrup is applied its base rests on the floor and the foot remains suspended.

The stirrups can be made of duraluminum; they are then smaller and lighter in weight; they are kept fixed to the limb with plaster-of-Paris bandages, day and night.

Only a few plaster-of-Paris bandages should be used in order that the resulting cast be very light and thin. To insure immobilization, we must trust more to the stirrup than to the thickness of the bandage.

A complete apparatus with stirrup for immobilization should not weigh more than 5 pounds for a fracture of the femur, and not more than 3 pounds for a leg fracture. ROBERT P. MONTGOMERY, M.D.

Bernstein, A., and Stone, J. R.: March Fracture. A Report of 307 Cases and a New Method of Treatment. *J. Bone Surg.*, 1944, 26: 743.

From this series of 307 cases of march fracture, the following conclusions were drawn:

Prior to the introduction of "speed hikes" and prolonged marches in the curriculum of basic training, march fractures were rare entities. Soon after this change in the curriculum occurred, this syndrome was seen.

This pathological condition occurred in soldiers irrespective of age, height, weight, and general body build.

No usual or unusual deformities of the foot were associated with this condition.

One or more of the metatarsals may be involved at the same time, or at different times during the same training cycle.

There is no relation between preinduction occupation and the development of a march fracture.

Contrary to general opinion, this condition occurs in the colored soldier, although not nearly so frequently as in the white soldier.

The treatment, as described in this article, was found to be adequate enough to keep the soldier on duty without missing the greater portion of his training. After six or eight weeks, the soldier is able to perform his duties as well as the man who never had a march fracture.

The method of treatment described saves innumerable hospital and training days.

In the authors' opinion, the treatment of a march fracture of the foot by immobilization in a plaster-of-Paris bandage, as described in the literature, is not indicated, since this is not a complete fracture, and there is no loss of position or alignment. Furthermore, rigid immobilization causes bone and muscle atrophy of the involved foot and leg. When the plaster cast has been removed, it is necessary for the patient to receive physical therapy over a period of several weeks before he can return to his normal duties. With the new method of treatment, all this is obviated.

The treatment is not original, but has been used previously for fractures of the toes, bursitis between the heads of the metatarsals, and various other conditions of the foot.

Patients with a march fracture complain of pain during the push-off phase of the gait, that is, when the weight is born on the heads of the first, second, and fifth metatarsals, with the toes dorsiflexed and the heel off the ground. If during the gait the foot is held rigid, thus eliminating motion at the metatarsophalangeal joints, the pain is markedly decreased. In order to accomplish this same rigidity, a steel bar from ½ to ⅝ of an inch wide, ⅛ inch thick, and 6 inches long is countersunk into the sole of the shoe. Originally this bar was countersunk on the weight-bearing surface of the sole; but, as the sole wore down, the metal became more prominent, acted as a rocker and caused discomfort. At present the steel bar is countersunk on the underside or non-weight-bearing surface of the sole, and is held in position by 4 rivets.

The relief obtained by this means is very definite, and becomes more noticeable after several days, that is, as soon as the patient becomes accustomed to walking with a stiff-soled shoe. In this way, the patient may continue the greater part of his basic training with very little handicap. Most patients continue with their full training and are rarely hospitalized.

Occasionally, the patient is further relieved by placing a felt pad along the longitudinal arch, in order to redistribute the weight. The steel bar is kept in position for approximately four or five weeks, at which time the fracture has solidly healed. The metal bar can then be removed and used again.

Patients with march fracture of one foot are not hospitalized, but as soon as diagnosis is made clinically or roentgenographically they are sent to the Camp Shoe Repair Shop, with a requisition for a "march bar." Patients wait for their shoes to be repaired, and then report back to their companies for further training. In this way hospital days and training days are saved.

The sooner the bar is applied, the sooner can complete recovery be expected. Eleven cases, or 3.6 per cent, did not respond to this type of treatment. The latter patients were given thirty-day sick furloughs, with instructions to continue weight-bearing on the injured foot as much as pain would allow. On return from furlough, these patients are usually fit for full duty. ROBERT P. MONTGOMERY, M.D.

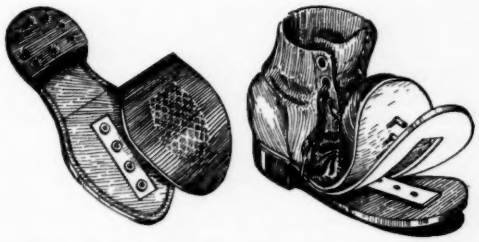

Fig. 1. Showing bar in place on nonweight-bearing surface of the sole of the shoe.

Howard, J. E., Parsons, W., Eisenberg, H., Stein, K. E., and Reidt, V.: Studies on Fracture Convalescence. Nitrogen Metabolism after Fracture and Skeletal Operations in Healthy Males. *Bull. Johns Hopkins Hosp.*, 1944, 75: 156.

A study of the metabolism and internal environment of patients who had suffered traumatic skeletal fractures was undertaken, with the hope that light might be thrown on the factors which provoke the high incidence of urinary lithiasis and the more rare renal complications, with a closer understanding of the metabolic processes during fracture recovery, and that therapeutic measures favoring optimal internal and external environment for the recovery of such patients might also be disclosed.

The present report deals with observations on the nitrogen metabolism of 6 patients following fractures of the large bones of the lower extremity, and includes comparative studies on 3 patients after operative procedures on the femur and 1 herniorrhaphy. The fracture studies were made on males, otherwise healthy, whose fractures healed satisfactorily. All patients were at bed rest in casts throughout the entire period of observation. Balance studies were begun as soon as the patients' general condition permitted accurate collections of urine and feces, which varied from one to seven days after the trauma had been sustained. In the osteotomy cases it was possible to collect metabolic data preoperatively as well as to make observations immediately after the operation. The results showed that all of the fracture cases showed losses of body protein of considerable magnitude. In 6 patients, the average loss of body nitrogen following fracture was more than 220 gm. Expressed in terms of protein, this would be about 1,400 gm. or, in terms of normal muscle protoplasm, 15 lb. (7 kilos).

The authors have divided their data into two phases, the first of protein loss, the second of protein repletion. On their basis, the duration of the phase of nitrogen loss in their patients averaged thirty-five and six-tenths days, and the study of their data in the repletion phase shows that these patients re-

plenished their lost nitrogen at a very slow rate. Nitrogen losses of a magnitude sustained by their fracture patients are probably of considerable importance to the body economy and must not be overlooked in designing therapeutic measures. The factors which might play a role in these nitrogen losses are: disuse, anesthesia, sulfonamide compound, fever, and infection; they are briefly discussed. Vigorous healthy male patients suffering skeletal fracture treated by ordinary methods sustain large losses of body nitrogen during the early phase of their convalescence. The catabolic nitrogen, which is excreted in the urine, does not reach its maximum until six days after the injury is sustained, and nitrogen equilibrium is not re-established for approximately thirty-five days.

Nonfracture operative cases sustain comparatively much smaller and shorter nitrogen losses and repletion is more rapid and vigorous. Disuse atrophy, bed rest, anesthesia, fever, and infection do not account for the major part of the nitrogen losses under discussion. Sulfonamide compounds did not appear to influence the over-all nitrogen metabolism in this group of patients.

EMIL C. ROBITSHEK, M.D.

ORTHOPEDICS IN GENERAL

Ghormley, R. K., and Hinchey, J. J.: The Use of Aluminum Acetate in the Treatment of Malacic Diseases of Bone. *J. Bone Surg.*, 1944, 26: 811.

The results obtained by the authors in treatment of malacic diseases of bone with aluminum acetate were as follows:

Of 10 patients suffering from osteoporosis who had followed the treatment six months or more, 8 were improved subjectively and 2 were the same as before treatment. All of 8 patients who had Paget's disease and who had followed the program for six months or more were improved symptomatically. In 4 patients who had osteitis fibrosa the condition had improved in 3 and 1 of these had followed the treatment for only two months. The improvement in 2 cases was considerable, as demonstrated by roentgenograms. In the case of 1 patient who had had osteogenesis imperfecta with repeated fractures and deformities since 1914, and who was unable to work and could hardly get around, the condition was improved after six months of treatment so that he could get around on crutches and work at a desk. He reported that he felt much better.

The clinical improvement, both subjective and objective, seems striking enough to the authors to warrant a further trial of the treatment.

The preparation of aluminum acetate used was as follows:

℞:	Solution of aluminum acetate	ʒv
	Syrup of tolu balsam	ʒiij
	Honey	to make ʒxvi

Directions: 1 teaspoonful, three times a day.

For children the dose was reduced according to the age and size of the patient.

The use of milk was recommended in all instances; if milk could not be tolerated by the patient, calcium in some other form was used. Vitamin D was administered in all cases.

Ward, R.: The Epidemiology of Poliomyelitis. *J. Bone Surg.*, 1944, 26: 829.

Perhaps the best way to begin a discussion of the epidemiology of poliomyelitis is to state that we do not yet know how poliomyelitis is transmitted.

Studies on the natural history of human poliomyelitis provide no support for the belief in the olfactory portal of entry of the virus, but they suggest that the entire alimentary tract may provide a site or sites of primary attack and invasion. The skin remains a possible portal of entry. The chief mode of elimination of virus at present appears to be by way of the stools. While the striking seasonal incidence, the evidence for the human alimentary tract as a portal of entry, and the finding of abundant virus in stools, sewage, and flies, do not establish these latter materials as definite links in the infection chain, nevertheless they suggest that poliomyelitis should be placed tentatively in the group of excremental infective diseases, until other modes of spread become established.

ROBERT P. MONTGOMERY, M.D.

SURGERY OF THE BLOOD AND LYMPH SYSTEMS

BLOOD VESSELS

Lange, K., and Boyd, L. J.: Use of the Fluorescein Method in the Establishment of the Diagnosis and Prognosis of Peripheral Vascular Diseases. *Arch. Int. M.*, 1944, 74: 175.

Injected intravenously, fluorescein can be made visible by a beam of long-wave ultraviolet radiation on reaching any area of exposed skin or mucous membranes. A photoelectric method to indicate the arrival of the dye and to measure the intensity of staining may also be used.

In over 1,000 patients examined by this method, the only untoward reaction was vomiting of short duration during the injection; this occurred in 11 patients. Experiments on animals showed extremely low toxicity. The dye diffuses immediately through the capillaries into the interstitial spaces and is partly adsorbed to the plasma proteins, pathological changes of which do not change the amount of fluorescein immediately available for diffusions. Dead cells do not stain. It has been shown by ultra filtration experiments that the amount of dye diffusing into the tissue depends on the intracapillary pressure. Changes in capillary permeability alter the amount which diffuses as well as the concentration. Even slight inflammation increases the fluorescence of the tissue. Pigmentation, especially in colored people, makes the test unreliable. Determinations of the normal circulation time between the arm and the lip is between fifteen and seventeen and a half seconds, while the time to the legs should not exceed twice this figure.

In 9 patients with acute embolism of the legs it was possible to define exactly the lowest possible level of amputation as far as the skin was concerned, and to decide at once on the probable formation of sufficient collateral circulation to avoid amputation. Block of the sympathetic lumbar ganglions should be performed to avoid mistakes caused by vasospasm. The immediate diagnosis of thrombotic occlusion can also be made. Small gangrenous areas in arteriosclerotic peripheral vascular disease can be judged as to the prospect for healing, localization, or further spread; varicose ulcers of the leg can be judged as to their outlook for healing and skin-grafting, and syphilitic leg ulcers have a specific picture distinguishing them from varicose ulcers. Thromboangiitis obliterans has usually a higher fluorescence than one would expect from the lack of arterial pulsations. Vasospastic disorders have a low fluorescence during the attack, which immediately returns to normal or even increases above normal on blockage of the sympathetic chain. Rubor due to inflammation in a limb with arteriosclerotic peripheral vascular disease can be well differentiated from venous congestion. Thrombophlebitis of the superficial vessels can be well made out as long as it is inflammatory and the extent of the inflammation can be outlined.

WALTER H. NADLER, M.D.

Lazarus, J. A., and Marks, M. S.: Aneurysm of the Renal Artery—True and False—with Special Reference to Preoperative Diagnosis. *J. Urol.*, Balt., 1944, 52: 199.

Aneurysm of the renal artery is a rare clinical entity, as evidenced by the fact that the authors were able to collect only 75 cases from the literature. This includes the case here presented.

A history of trauma was elicited in 34.7 per cent of these cases. Among the other etiological factors associated with this condition are systemic debilitating infections and atherosclerosis.

Pathologically, aneurysms may be classified as (a) true, and (b) false. True aneurysm is a saccular dilatation of an artery containing all the elements of the arterial wall, and results from weakening of the arterial wall as a result of sclerosis, fatty degeneration involving the elastic fibers from some debilitating systemic infection, or from atherosclerosis. A false aneurysm is a saccular dilatation of an artery due to trauma which results in complete disruption of the continuity of the arterial wall either in part or in its entirety, in which the limiting walls from without inward consist of adventitia, laminated blood clot, and endothelium.

Small aneurysms of the renal artery usually give rise to no symptoms. Larger aneurysms, however, usually give rise to symptoms, the most common of which is pain in the loin (62.7 per cent). A mass was felt in the loin in 30 per cent of the recorded cases.

The presence of an opaque ring shadow with a dense periphery on the x-ray film in the region of the renal pelvis is an extremely valuable diagnostic sign of this disease.

The indicated procedure in the treatment of aneurysm of the renal artery is immediate nephrectomy with ligation of the renal artery proximal to the point of origin of the aneurysm.

JOHN J. MALONEY, M.D.

Monahan, D. T.: Ligation of the Aorta and Both Common Iliac Arteries for Aneurysm. *Surgery*, 1944, 16: 519.

A forty-nine-year-old syphilitic negro was laparotomized for aortic aneurysm. The tumor was found to extend from above the inferior mesenteric artery to, and involving, the bifurcation into the common iliac arteries, so that all three of these arteries involved by the aneurysmal sac.

Immediately proximal to the aneurysmal mass, a rubber band about ¾ inch wide was placed under the aorta and sutured in the shape of a funnel with three No. 1 interrupted silk mattress sutures, so placed that if the knots were to slip the sharp stitches would rub on the rubber and not on the aorta itself.

This band interrupted about three-fourths of the circulation into the aneurysm.

Three weeks later the abdomen was again opened. The aneurysm was about the same size, and pulsating, although not as strongly as before the partial occlusion. A curved clamp was inserted under the aorta just proximal to the aneurysm and a piece of rubber band ½ inch wide was brought under it, below the first band, and sutured with 3 fine silk sutures so that the vessel was completely occluded. There was no pulsation then of either the aneurysm or the common iliac vessels.

Again, somewhat more than a month later, the abdomen was opened, the area of the second rubber band was exposed, a curved clamp was placed behind the aorta at this site, and 2 heavy silk ties were placed but not tied. At this point, brisk bleeding was encountered, the source of which was a tear in the inferior mesenteric artery about 1½ inches from its point of entry into the aneurysm. This vessel was clamped and tied, as were also both common iliac arteries, about 1 inch from the aneurysm. The heavy silk ties proximal to the aneurysm were then tied. The patient had a relatively uneventful recovery and convalescence. For three months after the last operation the patient complained of pains in the right leg and foot but he was always able to be up and about. These pains were obviously due to the fact that the right leg was not so well supplied with collaterals as the left. Sudden death then occurred from bleeding into the third portion of the duodenum from a perforation of the aorta immediately above the area of occlusion.

Autopsy disclosed that the area of occlusion of the aorta had been transformed into a cicatricial band of cartilaginous consistency, and the aneurysm itself and the arterial branches leading away from it had shrunken and filled with old organized clot. The epigastric vessels were competent but not dilated. There were many small vessels which could be seen coursing over the pelvic peritoneum. There was no evidence of a diminished blood supply to the sigmoid colon. Immediately above the occluded area of the aorta there had developed a small secondary aneurysm, with perforation into the duodenum. Syphilitic aortitis was demonstrated microscopically.

The 7 successful (in Bigger's sense) occlusion operations for aortic aneurysm, all reported since 1920, are also briefly discussed. The author arrives at the conclusion that in the region of the lower abdominal aorta, at least, an occlusion in stages is distinctly feasible, and that it would seem likely that, from the standpoint of circulatory efficiency, many older patients also could withstand total occlusion in stages.

JOHN W. BRENNAN, M.D.

Castillo, G. R.: A Contribution on the Forms of Arteritis (Contribución al estudio de algunas arteritis). *Bol. hosp.*, Caracas, 1944, 43: 53.

This is a monograph on the general subject of arteritis, wherein the writer quotes, frequently at some length, from current articles and texts by such authors as Buerger, Edgar V. Allen of the Mayo clinic, Samuel Silbert and his collaborators, Lisa, Magiday, Galloway and Finlay, on diabetic gangrene; the lecturers at the 1936 meeting of the Societe Internationale de Chirurgie (Vol. II); E. Forgue in the "Precis de Pathologie Externe" for 1939 (Tome I); and numerous Spanish authors, as well as Dean Lewis and Raynaud, whose experience and study in this field have led to the acceptance of their expressions of opinion and their published data as medical axioms.

Of course, the author does not accede unequivocally to every pronouncement of every authority. Thus, he does not subscribe, on the basis of his own material, to the pronouncements of Buerger with regard to the etiological influence of race in thromboangiitis obliterans and he is unable to find evidence in Venezuela of any etiological factor in fungus diseases of the foot. Also, he does not seem enthusiastic about the newer forms of testing for the circulatory supply of the extremities, such as oscillometry and the Babinsky-Heitz modification (immersion of the extremity in hot water for ten minutes), the test of Aldrich and MacClure, the histamine-injection test, the test of Moskowicks with the Esmarch bandage, the test of Cosacesco (scratching the skin with a sharp point with failure, in circulatory inefficiency, of the reddening of healthy tissues), the test of ischemia on elevation and other postural tests, and the test of Collens and Wilensky (walking the patient about with observance of the time of appearance of symptoms of claudication), and even roentgenography and arteriography. He seems to prefer simple thermometry, with perhaps its combined procedures (Cohn's anesthesia raquidea, the test of Brown with typhoid vaccine, and Morton and Scott's infiltration of the posterior tibial nerve), both for diagnosis and evaluation of treatment and for determining the level of any eventual amputation. No etiological effects of cold or of humidity are found in Venezuela where extremes in these conditions do not occur.

The climate about Caracas was also investigated with regard to the temperature of the skin. It was found that with a temperature of 23°C. and a humidity of 75 per cent, the average temperature of the skin on the plantar surface of the big toe was 28.9°C. and that of the dorsum of the foot 29.9°C., but with each increase in temperature of 5°C., 1°C. must be added to each of the figures given.

All of the 15 patients in the author's material were treated, time permitting, with hypertonic saline solution, and if gangrene appeared and amputation could wait, preliminary ligation of the femoral vein was carried out. When amputation was decided upon, and its level determined on the basis of all available data, an attempt was made to carry out a leisurely technique, with preservation of the usefulness of the limb by the formation of a proper stump. For this purpose refrigeration anesthesia as introduced and developed by Frederick M. Allen was used. Finally, any antisyphilitic or other specific

treatment, and the injections of 5 per cent hypertonic saline solution were continued after the operation with a view to procuring a healthier stump and more rapid healing. Of course, postoperative infection was avoided if possible with careful asepsis, sulfonamides, and primary closure. One of the arteriosclerotic patients (a female) was successfully treated with injections of folliculin, and 2 of the patients with Buerger's disease underwent lumbar sympathectomies.

There was only 1 fatality, and that occurred in the patient with the unknown type of infection (this type of case nearly always terminates fatally), who came under treatment in a condition of extreme gravity with the process evolving with great rapidity.

Four of the 6 persons with the arteriosclerotic form of ischemia had amputations, and 2 recovered perfectly without operation, the success being ascribed in greater part to the efficacy of the injections of hypertonic saline solution. Of the patients with Buerger's disease, 1 was a chance finding at autopsy and had never had any symptoms leading to the recognition of the condition; 2 patients who underwent lumbar sympathectomy and 3 who did not recovered perfectly under persistent injections of hypertonic saline solution, and finally, the 2 patients with syphilis got well, one following treatment with arsenic and bismuth, and the other following the loss of the anterior half of his foot, under specific treatment combined with injections of hypertonic saline solution.

The problem of arteritis has not yet reached a solution; many questions remain to be answered, from the viewpoints of etiopathogenesis, anatomopathology, symptomatology, and treatment. However, students of this subject are continually bringing to light new knowledge for the benefit of these unfortunate patients, who suffer so much and who are so full of hope. JOHN W. BRENNAN, M.D.

Reynolds, J. T., and Jirka, F. J.: Embolic Occlusion of Major Arteries. *Surgery*, 1944, 16: 485.

Twenty-four patients were diagnosed as having an ischemia due to embolic occlusion in 27 limbs. Of these limbs, 9 were not operated upon. In one patient the embolus had moved, and in a second it could not be found. Thus there were 16 limbs from which an embolus was removed at operation (13 patients).

Ten of these emboli were removed within eight hours of their occurrence and all of the patients had a satisfactory return of the circulation. Of the remaining 6 emboli, 4 were successfully treated (1 after twenty-seven hours); 1 result was doubtful, and 1 was a failure.

Twelve of the patients died. All of these had had emboli removed. Seven died within the first few days after the removal of the embolus, apparently from cardiac failure, but all had had successful restoration of the peripheral circulation. Death in 4 of the remaining 5 was not related to the heart disease or the embolus, and might therefore have been avoided. However, part of the mortality rate in this series is ascribed to the fact that the authors, in consonance with the teachings of de Takats, do not favor operation on an ischemic limb when there is no significant prolongation of the venous filling time and the patient can freely use the muscles of the area in which the blood supply has been threatened. As this is usually true in the presence of emboli involving the arteries of the upper extremities and the popliteal artery, referral of such cases was not encouraged. In fact, in all of the patients with popliteal emboli included in the present series there was evidence of adequate collateral circulation from the start; none was subjected to embolectomy, and those who later required amputation were those who did not receive proper care (anticoagulants, intermittent venous compression, and antispasmodics).

The etiological significance of physical exhaustion, and changes or disturbances in the heart rate, particularly sudden variations in the intensity of digitalis therapy, is recognized, as well as the importance of locating the site of the occlusion with the aid of oscillometric readings when the diagnosis is made. As soon as the diagnosis is established, however, heparin (5 to 10 cc.) is administered intravenously at once and the patient is rushed to operation. Heparin is also administered for as long as fifteen days after operation in doses sufficient to maintain the clotting time at about fifteen minutes, and in like manner to patients who are not treated operatively. Fifty milligrams of heparin every four hours have been found adequate to keep this level, although larger quantities may often be required. (The antagonistic action of digitalis to the heparin may require adjustment of the heparin dosage.) Recently dicumarol has been used to supplement and supplant heparin; its dosage has been as follows: 300 mgm. the first day, 200 mgm. the second day, and 100 mgm. on the succeeding days.

Preoperative sympathetic nerve block and spinal anesthesia for the operation have been abandoned for fear that the relaxed artery may permit the blocking mass to slip farther to the periphery; this also applies in the case of papaverine and other vascular antispasmodics. Although sympathetic block has reportedly given considerable relief of pain, the risk of loss of the embolus makes the preoperative administration of narcotics a wise method of securing analgesia. However, sympathetic nerve block may be done just before the patient leaves the table, and should be repeated daily during the postoperative period. Papaverine is also given postoperatively. Antispasmodics are, of course, indicated in cases in which operation is not done.

During this postoperative period intermittent venous compression is also used continuously, either by means of the machine specially designed for this purpose, or with a blood-pressure cuff, which should be inflated to a reading of between 50 and 70 mm. of mercury and that pressure maintained long enough to fill the cutaneous veins and then left off long enough to allow emptying of the vessels. Al-

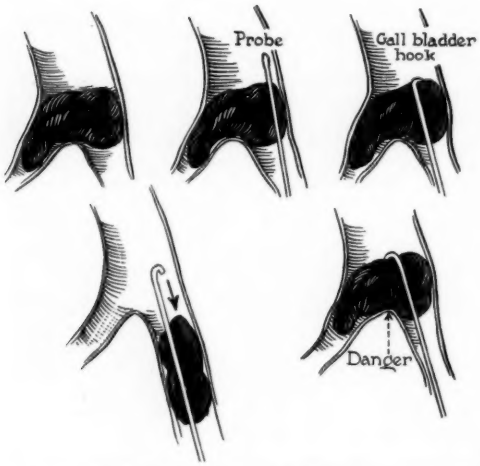

Fig. 1. Illustration to emphasize the maneuver used to extract a clot from an artery in which the clot has become wedged into the bifurcation and in which the arteriotomy has been done below the level of the clot. Note that the end of the probe must be above the clot before it is turned and pulled down. Note also that the probe must be turned away from the direction of the major proximal branch.

though the use of refrigeration has been reserved for those extremities which are unquestionably beyond therapy, its recent effect on 2 patients has been so encouraging that in the future it may well be extended. The postoperative treatment may be discontinued after a week or ten days when it is apparent that the peripheral pulse has been restored; otherwise cessation of the treatment should be gradual. The sympathetic block may be dispensed with after a week. Intermittent venous compression may then be given less intensively. The anticoagulant should be continued the longest. Two or three weeks should be a minimum time.

With regard to the operation itself, although the technique seems to be practically identical with that for the various arterial ligations, it is hoped that refinements in the method of extracting the clot may be made in the embolectomies most often required (those in the femoral, iliac, and aortic bifurcations). This is nearly always possible by incising the common femoral artery below the inguinal ligament (Fig. 1). JOHN W. BRENNAN, M.D.

McGrath, E. J., and Hermann, L. G.: The Influence of Estrogens on the Peripheral Vasomotor Mechanism. *Ann. Surg.*, 1944, 120: 607.

Raynaud noticed in 1862 that menstruation had no effect on patients with vasospastic attacks, but that the attacks of local syncope disappeared completely with pregnancy.

The authors have made an evaluation of the effect of estrogens on experimentally produced peripheral gangrene in the tail of the albino rat. (The mode of action of estrogens is essentially that of local liberation of acetylcholine.) All unprotected animals developed gangrene of the tail. All protected male rats also developed gangrene of the tail. Only 2 female rats, however, of 40 protected with theelin developed gangrene of the tail, and in these 2 the amount of the gangrene was incomparably less than that in the control animals.

The authors report their experience during the past ten years in translating the foregoing experimental studies into clinical therapeusis. They treated 345 patients with di-ovocylin (Ciba) (from 0.5 to 1.0 mgm., 3 times weekly for eight weeks). With the larger doses caution must be used in women. The authors report a high percentage of satisfactory results in the treatment of Raynaud's syndrome, thromboangiitis obliterans, arteriosclerosis obliterans, acute arterial occlusion, and chronic, long-standing phlebitis. JOSEPH GASTER, M.D.

Scarborough, H.: The Effect of Surgical Operation upon Capillary Resistance. *Edinburgh M. J.*, 1944, 51: 335.

The structure, functions, and physiological behavior of the capillaries in man are not easy to investigate. However, the capillary resistance, or fragility (the ease or difficulty with which the capillary walls rupture when a pressure is applied to them, can be measured with a satisfactory degree of accuracy provided that certain standard conditions are observed. The capillary walls may be subjected to a pressure strain by an increase of pressure within them, or, alternatively, by a negative pressure (suction) directed through the skin. Upon the latter procedure has been based a method for the accurate determination of capillary resistance. The resistance of the capillary walls to suction is assessed in terms of the least amount of negative pressure (suction), measured in millimeters of mercury, that is required to rupture a single capillary in the area under examination. The procedure does not necessarily measure capillary permeability; there are at present no experimental data on the relationship, if any, between capillary resistance and capillary permeability. Moreover, the procedure does not necessarily give any information about the resistance of the capillary walls in organs and tissues within the body.

It has previously been recorded that the extravascular suffusion of blood into the body tissues or alimentary tract is immediately followed by a marked but temporary rise in capillary resistance. The increase frequently amounts to over 100 per cent. It is evident within twelve hours after the injection of as little as 4 ml. of blood into a muscle, or the experimental introduction of blood into either the upper or lower end of the alimentary tract. The intramuscular injection of whole blood, plasma, reconstituted dehydrated serum, and particularly of concentrated red-cell suspensions, and transfusions of blood and plasma have all been followed by highly significant elevations of capillary resistance.

In this article are reported the results of exploratory capillary-resistance determinations made before and after certain surgical procedures. "Before" signifies within three hours of the time that the operation was started, and "after" means approximately twenty-four hours after the operation. No statistical treatment of the data is required to support the conclusion that in 23 investigated cases a remarkable increase in capillary resistance followed surgical operation.

In 6 cases of simple fracture, determinations of capillary resistance were made within twenty-four hours after the fracture and between five and seven days later. No case was operated upon or received blood or plasma transfusions between the time of the two observations on capillary resistance. In all cases the capillary resistance was significantly higher at the first observation than at the second, a finding which supports the results described following surgical operations, and which shows that similar increases in capillary resistance follow injuries which do not involve the skin surface.

This increase appears to be independent of the age and sex of the patient, of the anesthetic employed, and of the nature of the operation performed. No information is provided by this investigation as to the mechanism of this striking phenomenon, for which at present no physiological explanation is available. JOHN E. KIRKPATRICK, M.D.

BLOOD; TRANSFUSION

Pedley, F. G.: Hemoglobin Concentration in College Women. *Canad. M. Ass. J.*, 1944, 51: 351.

The hemoglobin concentration of 864 college girls is given. The estimations were made in the photoelectric colorimeter, which is believed to give more consistent results than the conventional hemoglobinometers.

In view of the fact that 40 per cent of the girls showed hemoglobin levels of between 14 and 16 gm. per 100 cc. of blood, it is suggested that a "good," if not "optimum," level of hemoglobin in women should be set at about 15 gm. per 100 cc.

The significance of small deviations below this level in terms of efficiency and health is not known.
HOWARD A. MCKNIGHT, M.D.

Propp, S., and Schwind, J. L.: Sternal Puncture as a Practical Diagnostic Procedure. *Ann. Int. M.*, 1944, 21: 580.

The author considers the sternal marrow puncture an extremely useful and practical procedure in the study of diseases of the blood and in cases in which the possibility of such diseases enters into the differential diagnosis. However, it should be used only on definite indications. A sternal puncture should always be made when (1) the diagnosis is in doubt and a disease usually showing a typical myelogram cannot be excluded—for example, an agranulocytosis in which there is the possibility of aleucemic leucemia; (2) the etiology of the peripheral blood findings is obscure ("aplastic" anemia or "idiopathic' anemia); (3) other means of diagnosis short of surgical biopsy have failed. In addition, a sternal puncture may be made to (1) save time if a specific marrow picture is likely to be present; (2) obtain information concerning prognosis; (3) determine response to treatment, as in a pernicious anemia which does not seem to benefit from liver-extract therapy; and (4) determine the type of a "stem cell" leucemia when this cannot be done with certainty from the peripheral blood.

The needles are of the 18-gauge spinal-puncture type with a heavy finger grip and a stylet. They are cut so that the needle portions are 2, 1.5, and 1 cm. in length. The two longer needles are used for adults, the choice depending upon the build of the individual, and the smallest one is used for infants and children. The shortness of the needles precludes the possibility of accidental perforation into the anterior mediastinum and prevents bending of the shaft of the needle during its insertion. The puncture is made in the midline of the body of the sternum at the level of the third costosternal articulation. This site is easily found, even in obese patients, by using the sternal angle, which marks the second rib, as a reference point. In children it is advisable to do the puncture in the third interspace because in some individuals the first and second sternebrae do not unite until adult life is reached. When properly carried out, under local anesthesia, sternal puncture is not a very painful procedure. The puncture needle is inserted vertically, and the outer table of the sternum is pierced by a rotary movement of the needle under firm pressure. When the needle is firmly fixed in the sternum, the stylet is removed, a tuberculin syringe is attached to the needle, and aspiration is attempted. If no marrow fluid appears, the stylet is replaced, the needle is advanced a little farther, and aspiration is again tried. From 0.1 to 0.2 c.c. of marrow fluid is withdrawn.

The most satisfactory portion of the specimen for study is that which enters the needle last and, therefore, this is used in making the first smears which are stained with Wright's stain.

Sternal puncture cannot be substituted for a complete clinical investigation of the patient. Indeed, the more thorough the work-up of the patient, the easier and more valuable is the interpretation of the puncture. Most diseases, unfortunately, do not show specific changes in the marrow from which a definite diagnosis can be made, but much clinically valuable information can be obtained which is of aid in the differential diagnosis and subsequent handling of the patient. Diagnosis should be made only from specific myelograms, and a negative result does not absolutely preclude the presence of a given disease, because of the possibility that a representative sample of marrow may not have been secured or atypical variations in the pathological lesions of the disease may be present. Punctures which yield no marrow cells upon aspiration should be followed by a trephine biopsy, if the diagnosis can

be reached in no other way, and no contraindications are present.

In the authors' series of 140 cases, 65 per cent of the 74 indicated punctures gave information of clinical value, and the diagnosis was made in 16.2 per cent when this was impossible by any other method short of biopsy. JOSEPH K. NARAT, M.D.

Weiss, D., and Haines, K. E.: Burn Trauma Precipitating Acute Leucemia or a Leucemoid Condition. *Am. J. M. Sc.*, 1944, 208: 490.

The authors present an interesting case of a young colored soldier who up to the time of being severely burned was apparently healthy and able to carry out the usual arduous duties of a soldier. On admission to the hospital his blood picture was normal; as time progressed his burned areas appeared to be healing satisfactorily, but, more or less rapidly, as recovery seemed certain, his blood picture became chaotic and suggested acute leucemia or a leucemoid condition. Weiss and Haines briefly discuss the infectious theories regarding the etiology of leucemia.

The pertinent contribution of this case report is the possible etiology in relation to the burn. Evidence and opinions that trauma is a possible etiological factor in acute leucemia are cited.

J. M. MORA, M.D.

Adams, W. E., Thornton, T. F., Jr., Allen, J. G., and Gonzalez, D. E.: The Danger and Prevention of Citrate Intoxication in Massive Transfusions of Whole Blood. *Ann. Surg.*, 1944, 120: 656.

The value of blood transfusions in improving and widening the scope of surgery has become more and more appreciated. They are used to prevent and treat shock and anoxia. Another purpose is the improvement or maintenance of blood-plasma proteins, a factor of importance in the healing of wounds and a satisfactory postoperative convalescence.

Actual determinations made following some thoracic operations have revealed that 1,500 cc. of blood are an average loss in lobectomy and pneumonectomy, while in some instances it is as much as 3,000 cc. Because of this, an attempt has been made to replace the blood with an equal amount of whole blood or plasma in order to maintain the circulating blood in a normal state.

Because of warnings against the too liberal use of citrate in large transfusions, experiments were planned by the authors to test the influence of various factors which might contribute to the harmful effects of massive transfusions of citrated whole blood. The methods used are described. The effect of sodium citrate on normal dogs was studied in 23 animals. From these experiments, the authors concluded that normal dogs tolerate approximately 0.25 gm. of sodium citrate per kilogram of body weight (sufficient to cover 60 per cent of the estimated blood volume with a 0.41 per cent solution) when not injected too rapidly (over a period of twenty minutes or longer).

The influence of calcium gluconate on citrate intoxication in normal dogs was studied in 4 animals. These experiments demonstrate that when ionizable calcium is made available, a higher concentration and a larger amount of sodium citrate may be given more rapidly without fatality (1 gm. per kilogram in from twenty to twenty-eight minutes).

Eleven dogs were studied for the effect of autotransfusions with citrated whole blood following hemorrhages of from 20 to 60 per cent of the estimated blood volume. The authors found that normal dogs will tolerate replacement with citrated whole blood after severe shock due to hemorrhage of from 20 to 60 per cent of the estimated blood volume (with sodium citrate to cover from 35 to 60 per cent of the blood volume) when given over a period of from twenty to thirty-five minutes.

Four dogs were studied for the influence of calcium gluconate on autotransfusion with citrated whole blood following hemorrhages of from 26 to 70 per cent of the estimated blood volume. It was noted that a larger blood loss and replacement with a higher concentration of sodium citrate given more rapidly (from three to thirteen minutes) was tolerated when calcium gluconate was administered.

In a study of 11 animals, the authors found that bleeding of from 30 to 50 per cent of the estimated blood volume and replacement with a similar amount of physiological saline solution, with or without the addition of calcium gluconate, was well tolerated when administered in from three to twenty-five minutes.

Simultaneous bleeding and replacement of blood loss with prepared citrated (0.41 per cent) whole blood were studied, first without the use of calcium gluconate and later with it. Four animals were used in the first group and 8 in the latter. It was concluded that normal dogs tolerate simultaneous bleeding and transfusion of citrated whole blood amounting to as much as from 75 to 125 per cent of the estimated blood volume. When calcium gluconate was added, as much as 200 per cent of the estimated blood volume was removed and replaced without fatality.

The authors found that large doses of citrate were necessary to produce harmful effects and that the rate of injection was an important factor. When the rate of injection of sodium citrate alone or as citrated blood was comparable to transfusions of 1,000 cc. of blood per hour in man, as much as 0.24 gm./kgm. of body weight, or sufficient citrate for use in 60 per cent of the estimated blood volume, was safely tolerated. If the administration was over a very short period (sufficient citrate for 60 per cent of the estimated blood volume given in from ten to twelve minutes), the action was usually fatal. No untoward effects were noted when physiological saline solution was used after severe hemorrhage. It appeared to make little difference when calcium gluconate was given with the saline solution.

These experiments would seem to indicate that animals in which shock has been produced are able

to tolerate citrated whole blood somewhat less well than animals in which shock is prevented by the administration of citrated whole blood during the bleeding period. The rate of administration should be somewhat slower in the patients in whom severe shock has resulted from massive hemorrhages.

The picture of citrate intoxication was similar regardless of the type of experiment. Alterations in the blood-pressure tracings were observed for several minutes prior to a rapid terminal fall. Some change in respiratory activity was usually present before fatal intoxication. Respiratory failure was never observed prior to cardiac failure. Definite tetanic contractions occurred in some of the second group of animals when citrate intoxication occurred. Eye reflexes were very sluggish. The color of the blood was very dark, and gas analyses revealed the oxygen to be as low as 3 or 4 volumes per cent. Severe acidosis was observed.

The use of calcium gluconate in preventing or treating citrate intoxication both in normal animals and in those that had had a loss of blood was extremely effective. The abnormal findings described soon returned to normal. The amount of calcium usually employed in animals weighing from 7 to 14 kgm. was approximately 4 gm. (20 cc. of a 20 per cent solution) for the replacement of from 60 to 100 per cent of the estimated blood volume.

The authors conclude that massive transfusions of citrated whole blood for the treatment of extreme shock (blood pressure of from 30 to 45 mm. of mercury), produced by hemorrhage of as much as 60 per cent of the estimated blood volume, were safely tolerated in dogs when the replacement of the blood loss was made during a period of twenty minutes or longer. When bleeding and transfusions were conducted simultaneously, an average of 112 per cent of the estimated blood volume was exchanged during a period of seventy minutes before the animal expired. This would correspond to a transfusion of 7,840 cc. of blood given during the same period of time for a man weighing 70 kgm. When the rate of bleeding and transfusion was less rapid, a larger volume was exchanged without reaction. Thus, a larger margin of safety is present even in massive transfusions of citrated whole blood or plasma when the administration is at the maximum rate currently employed in man (1,000 cc. per hour).

HERBERT F. THURSTON, M.D.

RETICULOENDOTHELIAL SYSTEM

Bailey, H. A., and Schreiber, S. L.: Delayed Rupture of the Spleen. *Am. J. Surg.*, 1944, 66: 4.

Rupture of the normal spleen has greatly increased in frequency and is not considered the rarity it was formerly thought to be. The literature has recorded consistent increases, explaining that they are due to greater industrial activity and greater use of the automobile.

The spleen is involved in 47.6 per cent of all subcutaneous injuries to the abdomen either isolated or complicated with other injuries. Therefore, injury to the spleen outranks trauma to the liver and to the kidney. Yet the diagnosis is too frequently missed. This pertains perhaps mostly to the delayed type of splenic rupture. All too frequently the diagnosis is made at autopsy.

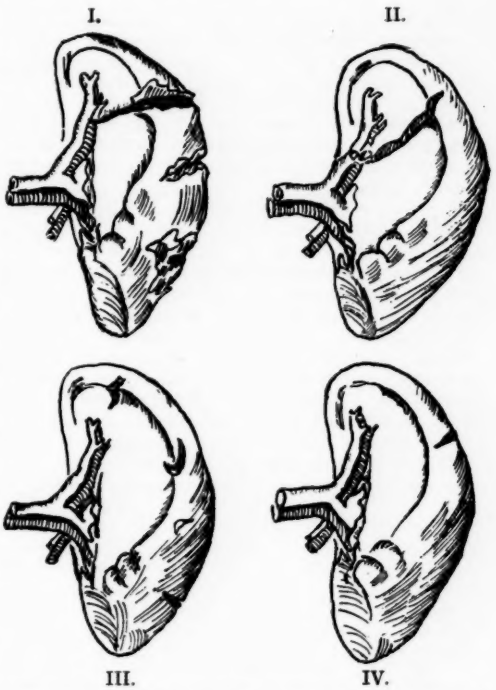

Fig. 1. Top: Diagrammatic representation of types I and II of splenic rupture, both leading to rapidly progressive hemorrhage. Variations of type I are a complete severance of the pedicle and a complete disruption of the spleen. Bottom: Diagrammatic representation of types III and IV of splenic rupture. Type IV is the lesion commonly responsible for the development of a perisplenic hematoma. (From Roettig et al.) (Courtesy of American Journal of Surgery.)

Difficulties in the diagnosis have been described as follows: (1) absent visible signs of injury to the anterior abdominal wall which permits the patient as well as the physician to disregard the early mild symptoms, since the reasoning is that the trauma sufficient to rupture a spleen should cause more visible signs of injury; (2) the history may be misleading, especially in those patients who have had severe or violent muscular activity some hours preceding the onset of symptoms; (3) the shock which is present is thought to result from associated injuries to the head, chest, or extremities, or to alcoholism; that is, the patient may present more obvious symptoms from his associated or complicating

injuries; and (4) the recession of symptoms lulls the observers and patient into a false sense of security. Added to these difficulties is the delay of the patient in seeking medical care: that is, the time consumed in getting the patient to the hospital or the doctor to the patient from the onset of the accident, or the time consumed in combating shock so that the symptoms of ruptured spleen may recede or become quiescent; or the difficulty in making the diagnosis in the presence of multiple injuries, which can well explain why a rupture of the spleen can be overlooked.

The authors report a case history of one of their own patients who was suddenly seized with an acute upper abdominal pain and who exhibited a tender rigid abdomen. X-ray examination was negative. A diagnosis of perforated peptic ulcer was made and at operation a ruptured spleen was found. No history of violence was obtained. Such cases are among the most difficult as regards preoperative diagnosis.

Five types of splenic rupture are described:

Type 1 is a complete fragmentation of the spleen into two or more parts or a complete tearing of the spleen from its pedicle. This results in a massive hemorrhage and in many instances sudden death.

Type 2 represents a large tear at or near the hilus. This gives rise to grave hemorrhage.

Type 3 is characterized by one large tear or multiple tears about the periphery of the spleen. This type leads to slow and persistent development of the signs of intra-abdominal hemorrhage.

Type 4 is characterized by a solitary tear at the periphery. Symptoms of this type are of recovery after an initial injury and after a period of relief the patient goes suddenly into shock with all the signs and symptoms of a concealed hemorrhage and gradually becomes worse.

Type 5 is a subcapsular hematoma and corresponds to Blocker's Type 2 "intrasplenic or subcapsular hematoma." This may be the so-called "spontaneous cure" group of Wright and Prigot, but, if so, this spontaneous cure is not a fact as no instance of healed splenic hematoma has been found.

The authors present the theories and observations relating to splenic rupture as listed by Zabinski and Harkins. BENJAMIN GOLDMAN, M.D.

SURGICAL TECHNIQUE

WAR SURGERY

Rob, C. G.: The Conservative Treatment of Abdominal Wounds. *Lancet*, Lond., 1944, 247: 521.

This article is based on 141 war wounds with definite abdominal signs. Laparotomy was performed in 98, with 33 deaths. Ten of these laparotomies were found to be unnecessary and 1 of the deaths occurred in this group. Laparotomy was not performed in 43 cases and no deaths occurred among these 43 cases.

In deciding whether or not cases required laparotomy, the staff was guided by the patient's general condition, especially his blood pressure and pulse rate. Due allowance was made for the effects of morphine which had been administered previously. Other signs especially considered were tenderness and rigidity, absence of respiratory movements, and silence on auscultation.

It was found that the ordinary signs and symptoms of an "acute abdomen" do not hold in gunshot wounds.

Conservative treatment consisted primarily of observation. Operative treatment was performed in most cases through a paramedian incision. Treatment consisted of suturing all perforations of the alimentary tract proximal to the ileocecal valve. Resection was necessary in 10 cases, with 4 deaths. Most of the wounds of the large intestine were exteriorized.

Bladder wounds were sutured and suprapubic cystostomy was performed. Peritoneal drainage was not used in most cases. Wounds of the spleen were treated by splenectomy. Wounds of the liver were sutured or packed. Renal wounds were treated conservatively. Nephrectomy was necessary in 3 cases.

Penicillin and gas-gangrene serum were used prophylactically. Postoperatively, blood or plasma, or glucose-saline solution was used. Gastric suction was used when indicated.

The sulfonamides and morphine were used liberally. Blood was administered to most patients postoperatively.

All patients were retained from ten to fourteen days before evacuation.

Residual intraperitoneal abscesses were rarely present; the sulfonamides were given credit for this finding.

Eighteen deaths were ascribed to shock and hemorrhage; 6 were due to peritonitis; 3 patients were beyond visceral repair. Three deaths were due to pulmonary emboli, while cerebral abscess and acute pancreatitis caused 1 death each. In 1 case a high gastric perforation was missed. Six patients died after admission but before they could reach the operating room.

In the cases with recovery, the average time between injury and operation was eight and four-tenths hours. In those with death from shock, the average time was fifteen hours. In those with death from peritonitis, the average time was twenty-five and one-half hours. RICHARD J. BENNETT, JR., M.D.

Weddell, J. M.: Surgery in Tunisia. *Brit. M. J.* 1944, 2: 459.

The author describes the general lay-out of the medical units with the British forces during the Tunisian campaign and indicates some of the points of interest and lessons learned during that period.

The Thomas splint, usually with the metal bootclip, was universally and correctly used. Tourniquets were rarely seen and rarely necessary. There was a tendency at times to overdo the injections of morphine. If patients passed through several posts they were sometimes found to have received as much as a grain of morphine by the time they arrived at the operating center.

The question of blood versus plasma has been much discussed. The experience of the British surgeons was that patients with severe injuries could be restored to a reasonable condition with plasma, but that they would not then stand an operation of one hour's duration without blood. Blood was neither wasted nor used excessively. In attempting to forecast the number of patients who will require resuscitation, various factors should be borne in mind. If the unit is dealing with first priority cases, a large proportion (probably over 50 per cent) will require resuscitation; if with second and third priorities, there will not be so many. The longer the time lag in the receipt of the cases, the more will require resuscitation. Local conditions, cold wet weather, a long journey over rough roads, will also have an effect.

Apart from the use of ether for laparotomies and multiple wounds, most patients were anesthetized with pentothal. The advantages of this drug are the rapidity of induction and the freedom from postanesthetic vomiting—a point of the greatest importance in the busy postoperative wards. Pentothal with oxygen was very satisfactory for the thoracic cases.

In the early stages of the fighting, cases were observed from which too much skin had been excised; a few attempts at primary suture, too tight packing of wounds, and insufficient division of the deep fascia were also noted. Adequate division of the deep fascia was found necessary especially in wounds of the buttock, calf, and popliteal space.

Extremities and joints. For transport during evacuation some form of the "Tobruk" plaster was universally used for the lower limb. Generally the limb was encased in plaster, with slits for the traction strapping and fixation of the limb to the Thomas splint with plaster bandages. The plasters were always padded and split. For the upper extremity the "U" plaster, from the nape of the neck and including the forearm, was most used, and proved satis-

factory. The immobilization of extensive soft-tissue wounds had been advised, but was perhaps not carried out as often as it might have been. Traction for wounds of the knee joint was occasionally found to have been omitted. The usual faults in plaster work appeared from time to time: carrying the plaster beyond the proximal crease of the palm so that stiffness of the metacarpophalangeal joints and fingers resulted; lack of instruction to the patients to move the fingers and toes continually; faulty position of the ankle and foot.

Abdomen. The treatment evolved in the Middle East was amply confirmed: suture, when possible, rather than resection; exteriorization and colostomy for wounds of the colon and rectum; gastric suction and intravenous therapy as a routine; and retention of cases for a minimum of ten days.

Chest. Conservative surgery (wound excision and closure of the open pneumothorax) with early aspiration was the rule, and proved satisfactory. Great relief of dyspnea was noted after the early aspirations of hemothorax fluid. Many breathless, shocked patients were greatly relieved by being propped up; these patients travel better in ambulances and trains when so positioned. The advantage of treating the shock by the completely recumbent position does not compensate for the serious respiratory embarrassment caused. In only a few cases was full thoracotomy indicated in the forward area.

Head. At the beginning there was some difference of opinion between the general surgeons and the neurosurgeons as to whether the general surgeons should deal with these cases. It was pointed out that in the forward units the general surgeon had no special equipment for this type of work: diathermy was not available; x-ray examination was not always possible; and at the time there was only improvised suction. It was therefore accepted that it was better to get patients back to the neurosurgical unit within forty-eight hours if this was possible, for operation there. The sulfonamides (sulfadiazine when available) were always used.

Burns. All coagulation treatment was forbidden as first aid. The routine was sulfanilamide and vaselined-gauze dressing. It was confirmed that cases of severe burns travel badly during the first five or six days after injury.

Chemotherapy. Sulfonamides were used prophylactically and therapeutically. To begin with, oral doses at four-hour intervals had been advised for all wounded. In practice this broke down on the long lines of communication, and the Middle East sulfanilamide label, with the two doses at 8 a.m. and 6 p.m., was adopted. Because of the universal use of these drugs, both orally and locally, it was impossible to evaluate their effect. The general impression was that they were of value in retarding the onset of infection. Also, as compared with the last war, the appearance and general condition of the men in the base hospitals seemed better. Sulfanilamide, sulfathiazole, and sulfapyridine were the forms mainly in use for surgical cases.

Anaerobic infections. Tetanus: Up to May, 1943, 1 case of generalized tetanus occurred in a German prisoner of war and 1 case of local tetanus occurred in a British soldier. Both recovered. Gas gangrene: Up to May, 1943, there had been less than 100 cases. Treatment consisted of early surgery, large doses of serum, and administration of the sulfonamides.

JOSEPH K. NARAT, M.D.

Morris, G. N.: Experiences with a Mobile Surgical Team on an Amphibious Operation in New Guinea. *Med. J. Australia,* 1944, 2: 402.

A surgical team consisting of 2 surgeons and 3 orderlies was detached from a general hospital and assigned to service the troops of an Australian Infantry Division in the battles on the Huon Peninsula. Its function was to provide surgical treatment for the wounded as far forward as possible. This team worked at the main dressing station of a field ambulance, but never was able to function as far forward as the advanced dressing station. It began service with the initial landing at Red Beach in the attack on Lae. It then leapfrogged to another point on Lae where it served for ten days, and then moved again to partake in the attack on Finschhafen. In the latter landing, the surgical team began operating within an hour of reaching its site on Scarlet Beach. Most of the time it was found advantageous to "dig in" the operating tent to a depth of 4 feet so as to protect the patients on the operating tables from flying bomb fragments. On many occasions, the surgeons were forced to finish operations in the squatting position.

The total weight of the equipment carried by this 5-man surgical team was reduced to 1,000 lbs. which was packed in 40-lb. lots. The surgical instruments consisted of 12 hemostats, 2 scissors, 2 tissue forceps, skull forceps, amputation saw, scalpels, needles, and 1 set of retractors, all packed in a kettle sterilizer. Also, 2 sealed Johnson and Johnson drums containing sterile gowns and dressings, 2 primus stoves, and 2 gallons of kerosene were carried. These items approximated a 40 lb. pack. Every man carried just enough clothes for a single change. Only 1 standard light-weight portable operating table was carried. Other operating tables were made of crude, forked sticks to which the stretcher was attached. Operating tables were looked upon as a convenience rather than a necessity.

This surgical team treated 400 casualties in a period of three months, with a maximum of 50 casualties per day. In this group there were 26 abdominal wounds involving either a solid or hollow viscus, or the mesentery. Many of these were multiple wounds. Other major casualties consisted of 16 penetrating chest wounds, 16 penetrating wounds of the skull, 10 compound fractures of the femur, 22 fractures of the tibia, and 13 fractures of the humerus. The most common wound sites were found to be the arms and legs.

The following points of clinical interest were drawn from these cases:

Patients with head injuries who were completely unconscious from a penetrating wound were not worth operating upon, especially if other serious casualties were waiting for emergency treatment. Further, it was not advisable to evacuate penetrating skull wounds for a few days. Patients with penetrating chest wounds should be sutured immediately. Aspiration of a pressure pneumothorax with syringe and needle always proved to be a life-saving procedure. In addition to essential surgery for penetrating abdominal wounds, all casualties in this battle area were given quinine intravenously twice daily to combat malaria. In extensive wounds of the lower extremity, incision for gangrene was delayed until thorough débridement had been made. In 8 cases, main-stem arteries were ligated—4 brachial arteries, 12 hypogastric arteries, and 2 femoral arteries. In this series, only 2 cases of gas gangrene developed, one from a buttock wound and the other from an incomplete débridement. Sodium pentothal given intravenously was the anesthetic of choice. Blood for resuscitation was obtained from combat soldiers of O(IV) blood group. All recipients of blood were given quinine. B. G. P. SHAFIROFF, M.D.

OPERATIVE SURGERY AND TECHNIQUE; POSTOPERATIVE TREATMENT

Marshall, D. V. Pulsator Treatment of Crush Injury. *Lancet*, Lond., 1944, 247: 562.

Four cases of crush injury which occurred two years ago after an air-raid are recorded; the results were unexpectedly good. The Booth respirator was used in their treatment. The author has had no opportunity of trying the method in additional cases.

During the severe raids in the spring of 1941, quite a number of patients, having been buried under masonry and extracted after varying periods of time (from four to ten hours), came to hospital showing little in the way of external or internal injuries but soon after their limbs became numb and swollen, and about forty-eight hours after admission they suddenly became ill and died the next day or later, blood being found in the urine some hours beforehand. One patient's arm was treated for about ten hours in a Booth respirator before she was transferred to a hospital in the country. The patient said her arm felt very much better after the treatments, and it recovered quickly. This incident prompted the author to treat all of the crush injuries which came under his care in York in the Booth respirator.

As soon as possible after the diagnosis of crush injury was made, the damaged limb or limbs were placed in the respirator and the pulsation mechanism was worked at the slowest rate provided for about half an hour. Four patients received treatment for this period every two or three hours in rotation. The treatment was continued regularly, except during sleep, until the circulation of the affected parts seemed to be restored, as judged by the diminution of pain, return of warmth and color, and loss of tension. All of the patients recovered, and 3 said that their pain was much reduced by the treatment and that they felt generally better; the patient who was injured least and who was mentally clearest was most emphatic on this point. One woman who was most severely crushed, and who complained of so much pain that at first it was thought she had a fractured pelvis in addition to her leg injury, did not experience relief, and found moving from the bed and in and out of the respirator rather trying.

Most of the efforts in treatment have been concerned with preventing renal damage by medication or treatment directed toward relieving the kidneys or preventing the toxin from getting to the kidneys in large amounts after damage has occurred. The treatment is also aimed at preventing changes in the muscle by relieving or improving the circulation at the earliest moment.

It is suggested that the fatal result of the crush-injury syndrome may be prevented by prompt restoration of the circulation in the affected part with a mechanical pulsator. JOHN E. KIRKPATRICK, M.D.

Swenson, S. A., Jr., Harkins, H. N., and Groesbeck, H. P.: Pilonidal Sinus. Clinical Experiences with the Rogers Operation in 35 Consecutive Cases. *Am. J. Surg.*, 1944, 66: 49.

The authors report their experiences with the Rogers operation in 35 consecutive cases of pilonidal sinus. They state that with this procedure there is complete removal of the diseased tissue, healing takes place in the presence of infection, the rate of recurrence is low, and the patient loses little or no time from his work.

Local novocain anesthesia was used in 20 cases, spinocaine in 14 cases, and general anesthesia in 1 case. In this series the Bovie cautery was used on hospitalized patients, and a modified radio-cautery was used on out-patients. A narrow ellipse of skin was marked out above the sinus tract or cyst. Healing was more rapid in the cases which did not have overhanging edges. The authors state that the use of the cautery knife provides a bloodless field which aids in the recognition of unstained normal tissue.

Diseased tissue is less readily divided by the cautery knife than is normal tissue. The dissection is carried down to, but does not divide, the diseased tissue in the attempt to remove the tract en bloc. The defect resulting from the removal of the diseased tissue is packed with dry gauze and a small dressing is applied. Out-patients are permitted to go home immediately and they may return to work.

The first change of dressings is carried out on the fifth or the sixth day, and a new pack is inserted. This pack is allowed to remain for two days, and on the third day it is removed in a sitz bath. The patient then takes two sitz baths a day, applying a dry sterile dressing after each bath. He returns to the clinic twice a week until the terminal stages of healing, after which he reports weekly.

Hospital patients are treated similarly. Frequent visits to the clinic are recommended as being more

important during the last few weeks of healing because the whole success of this method of treatment depends upon proper care, preferably by the original operator.

In this series of 35 cases, 25 per cent of the patients were females, and 75 per cent were males. The average age was twenty-six years. Seventeen of the patients were from twenty to twenty-nine years. Fifteen patients had known of their lesions for one year or less; 15 had had previous or preliminary treatment. In 14 patients the duration of the drainage was from one week to two months. Twenty-four patients presented only one sinus tract. In 23 patients the in-patient procedure was carried out, and in 12 the "out-patient" treatment was given. In the cases of the 23 hospital patients, the average stay was six and one-half days. The average number of postoperative visits was 10, and the average healing time in 30 cases was fourteen and one-half weeks.

The advantages of this procedure are the low cost, the small amount of tissue removed, and the high percentage of primary cures.

RICHARD J. BENNETT, JR., M.D.

Zintel, H. A., Riegel, C., Peters, R., Rhoads, J. E., and Ravdin, I. S.: Intravenous Administration of Dextrose in the Treatment of Patients with Disease of the Biliary Tract. *Arch. Surg.*, 1944, 49: 238.

Biopsy specimens of the liver were taken from a group of 58 patients with disease of the biliary tract. Eighteen of these patients received dextrose intravenously before operation, while the remaining 40 were controls and received none. The average glycogen level of the liver of the patients who received dextrose intravenously was 6.1 per cent, or 118 per cent greater than the average glycogen level of the control group.

The patients who had moderate hepatic damage, as judged by histological studies, and who received dextrose intravenously had an average hepatic glycogen level of 5.7 per cent, or 104 per cent more than the level observed in the control patients. Intravenous administration of dextrose without dietary supplement did not significantly lower the fat content of the liver in the patients observed.

The authors state that the protection of the liver against damage resolves itself into the positive action of protein, the indirect action of carbohydrate, and the negative action of fat. The results of administration of a diet high in carbohydrate and protein, low in fat, and high in calories for five days or more before operation, while excellent from the standpoint of reducing the fat content of the liver, were not impressive from the standpoint of the degree of elevation of the glycogen level. The average increase of liver glycogen after such a diet in patients with severe hepatic damage was 10 per cent. On the other hand, there was no evidence in the patients who received dextrose intravenously that the fat content was significantly lowered.

In the light of these findings, the optimum preparation of patients with hepatic damage for surgical operation would probably be obtained with the administration of a diet high in protein and carbohydrate and low in fat for a period of from five to fourteen days, supplemented by intravenously administered dextrose for a period immediately prior to operation.

Liver glycogen is so labile that if one desires to maintain it at a high level during an operation, intravenous administration of dextrose is fully justified, especially during the period of fasting immediately before operation. As much as 45 per cent of the liver glycogen may be lost during the course of a long operation, as reported by Ariel, Pack, and Rhoads.

HERBERT F. THURSTON, M.D.

Brown, J. B., and Cannon, B.: The Repair of Surface Defects of the Foot. *Ann. Surg.*, 1944, 120: 417.

The skin and subcutaneous tissues of the sole of the foot and of the palm of the hand constitute a specialized organ. Skin and subcutaneous tissue transplanted to the sole of the foot from other areas of the body do not constitute a normal sole and there may be difficulty in maintaining them in a satisfactory condition in their new environment and function. Keratosis, warts, cracks, and chronic ulcers may appear and cause disability. If nerves are present in the area of the sole, even in free grafts and flaps, sensation will return.

Small lesions of the foot may produce disability and especially in military service may cause complete loss of a soldier because one of the most important functions of a soldier is lost if he cannot walk.

The preoperative care includes rest, baths, soap and water, sulfonamides or penicillin, fine mesh gauze next to open wounds, pressure dressings, and elastic bandaging of the foot and leg. Every effort is made to get these wounds as clean as possible, guided by bacteriological studies. No repair or operation may be even contemplated until all sloughs, dead tendons, fascia, and bone are out of the wound. There must also be good healing power which will support transplanted tissue. Physical therapy is used in all cases.

When a flap is lost, the donor site may be worse than the original lesion. Radical excision must be carried out in widespread scars so that a new blood supply may be developed to support the transplanted tissues. Burns and superficial lesions respond well to free grafts, although gunshot and shell-fragment wounds or other deep injuries may require a flap repair. Flaps will not do well where grafts will not do well. A distant flap does not bring additional blood supply but just helps the local minute blood supply temporarily. Local flaps bring in their own blood supply and improve the local circulation. Local flaps may deprive another area of a satisfactory covering and may cause loss of important local sensory nerves. Local flaps which uncover important weight-bearing points, the heel cord, or the malleoli, should not be used.

The methods of repair include:

1. Excision of the scars and immediate resuture. This may be carried out only occasionally because of lack of extra tissue in the foot. Large losses practically always need some type of replacement even though it proves a poor substitute.

2. Free skin grafts may be used if a satisfactory thickness of subcutaneous tissue remains to give support and blood supply. Open wounds on the sole of the foot are subject to severe disabling infections and should be closed as soon as possible. Free grafts may be used to get the wound closed as soon as possible, and later on a flap may be used for permanent closure.

3. Direct local flaps may give excellent repairs of small lesions if important sensation is not interrupted and both the local blood supply and the blood supply of the flap is adequate.

4. Delayed local flaps are the safest form to use locally; at least two stages of operation should be used. Detachment of flaps may usually be carried out in from sixteen to twenty days. In large flaps, partial detachment in 2 or 3 stages may be carried out with more safety.

5. Direct cross-leg flaps may be used if a suitable position can be decided upon.

6. Delayed cross-leg flaps, either flat or tubed, are safest.

7. Same-leg delayed flaps may be used occasionally; they should be tubed rather than flat.

8. Distant turnover, jump, or caterpillar flaps from the abdomen or flank are a rare necessity.

9. Distant wrist-borne flaps are used occasionally. Tubed flaps need a special type of application. Large long tubes should be attached in a normal site close to the defects.

One of the most difficult problems in postoperative care is to keep the patient off the new repair for a sufficient length of time. Local trauma and extremes of temperature should be avoided.

A wide knowledge of the faults of flaps and grafts must be acquired so that these difficulties may be guarded against. Ordinary skin will not change into normal foot tissue, and continued protection, cleanliness, careful observation, and pads are necessary. Prevention is better than cure. Some surgeons believe that only sole tissue should be used on the sole. The end-results in skin repair of the foot vary from poor to practically normal. Prolonged disability has been relieved by single procedures.

RICHARD J. BENNETT, JR., M.D.

Young, F.: Skin-Graft Fixation by Plasma-Thrombin Adhesion. *Ann. Surg.*, 1944, 120: 450.

The author notes that the survival of a free skin graft depends upon the rapid establishment of an adequate circulation. During the first twelve to twenty-four hours after transplantation, it is generally believed that there is an osmotic flow of plasma into the graft.

The early vascularization of a skin graft may be delayed or prevented by numerous factors. The graft may be too thick or of too great area for the vascularity of the bed in question. A full-thickness skin graft will rarely take on a granulating surface. Full-thickness grafts when applied to fresh surgical wounds have a higher percentage of take when the graft is from a thin skin area, such as the groin, inner surface of the upper arm, or eyelid. It is also well known that full-thickness grafts have a higher percentage of take than those of large square area since in the smaller graft the peripheral circulation established is relatively of more importance. In general, the thinner and smaller the graft, the higher percentage of success.

The character of the bed is important for the survival of the free skin graft. A high percentage of take cannot be expected on an avascular, fibrotic bed. The percentage of take is usually lower on a soft, yielding, irregular surface than on a smooth firm bed.

There are numerous untoward effects which can prevent complete continuous contact. The graft may slip off of the recipient area or it may be lifted off the bed by bleeding. Infection may cause the formation of purulent exudate under the graft, and on irregular surfaces the graft may be stretched across depressions and the bed may move unless adequately splinted.

In the past a high percentage of takes has been obtained by careful attention to many details, one of which was the use of compression dressings to keep the graft firmly in contact with all irregularities of the bed. Joints were splinted and inlay forms used on parts where splinting was not possible.

Fixation of split-thickness grafts on either fresh surgical wounds or granulating beds can be accomplished by the precipitation of fibrin between the graft and the bed by adding thrombin to plasma. The rate of fibrin formation can be adjusted to any speed desired by increasing or decreasing the concentration of the thrombin solution.

The author states that 22 separate free split-thickness skin grafts were applied with the use of fibrin and without pressure dressings or suture. On extremities where the part could be suspended, no dressing whatever was used. On other parts merely a loose dry gauze for protection was applied. The amount of skin transferred at one operation has varied from 4 square inches to 200 square inches. The majority of cases were wounds of considerable dimension usually exceeding 30 square inches. The exact procedure followed in making the graft is given in detail as well as the preparation of the fibrin.

Because the percentage of take normally expected on fresh wounds is higher than on granulation tissue, the author divides these cases into two groups. Of 12 patients with a primary graft, 8 had free grafts placed on fresh surgical beds. There was no loss in this group. In each case the graft take was complete. The 4 remaining patients in whom the bed was fresh had traumatic contaminated wounds. In these the percentage of take was 48. The figure was lowered by total loss of the graft in 1 instance. In the 10 granulating wounds a 59 per cent average take was

estimated. In 2 instances the graft was lost completely. In all of the instances it was evident that the loss of graft was due to the accumulation of fluid under it. Large bulbous areas form, most of which, when opened, are found to contain purulent fluid.

On fresh surgical beds the percentage of take of free skin grafts is ordinarily high, and fixation by plasma-thrombin adhesion seems to afford an easy method of obtaining the usual high percentage of take. However, it is the impression of the author that in infected wounds the loss of grafts is considerably greater when they are applied by this method than when compression dressings are used. This applies to contaminated fresh wounds as well as to granulating beds. Infection is sealed under the graft, drainage is poor, and the result is a purulent collection under the graft which prevents vascularization. The greatest loss is at points of movement. This could be prevented by splinting. Small-size thin grafts take better than large thick sheets. It is probable that the mere application of the dressing would produce as high a percentage of take alone.

In conclusion, the author states that he believes the method is useful (1) in application of grafts on fresh surgical beds; (2) in holding grafts in position while compression dressings are applied; and (3) in applying small grafts, such as pinch grafts, for which compression dressings are ordinarily not used.

HERBERT F. THURSTON, M.D.

Webster, J. P.: Refrigerated Skin Grafts. *Ann. Surg.*, 1944, 120: 431.

Refrigerated grafts are seldom used in surgery today, although the technique is simple and its application has widespread uses. It is of special value in grafting young, debilitated, or extensively burned patients. The source of the grafts may be cadavers, amputated limbs as homografts or autografts, or the usual donor areas on trunk or limb of the patient himself or of others. Only autogenous skin grafts may be expected to survive permanently.

The procedure has been employed 36 times on 23 patients at the author's clinic during the past twelve years. All of the grafts lived if the recipient areas were suitable and if the grafts were autogenous and were not refrigerated for more than three weeks. In the author's experience those refrigerated over this period failed to survive. No homograft persisted permanently, although those refrigerated within the three-week period survived longer than those preserved beyond this time. Lyophilized skin was grafted in 1 case with partial but definite success after seventeen days of refrigeration. This procedure gives promise of being improved and of value. With a modified technique it may be possible to graft lyophilized skin with even greater success and beyond the three-week period of refrigeration.

The refrigeration of skin should be more widely used (a) to store excess remnants of grafts for possible future use; (b) to delay grafting until suitable conditions of the recipient area prevail; and (c) to divide long hazardous operations into two or more less taxing stages. By this procedure the plan of operations may be facilitated and lives may be saved.

LOUIS T. BYARS, M.D.

Crooke, A. C., Morris, C. J. O. R., and Bowler, R. G.: Plasma Volume in Traumatic Shock. *Brit. M. J.*, 1944, 2: 521.

The plasma volume (by the Evans blue dye method), hemoglobin, and hematocrit were measured in a series of patients suffering from traumatic shock. Corrections and technique modifications were made to overcome anomalous dye concentrations in the plasma due to turbidity, hemolysis, and the effect of morphine and hyoscine. A reduction in plasma volume was characteristic during shock and was proportional to the severity of shock. The test was most significant when determined early.

In the severe cases, reduction of the plasma volume averaged about 2 per cent of the body weight. In this series the author did not confirm Moon's correlation of shock with hemoconcentration as manifested by increased values for the hemoglobin and hematocrit cell volume. Rather, a reduction in the hemoglobin concentration was noted. This did not parallel the fall in plasma volume, but continued to fall as water was withdrawn from the tissues into the circulation, and became most pronounced after the plasma volume returned to normal. The conception of hemoconcentration in shock, according to the author, originates from the viscid, cyanosed appearance of the blood, which when examined with the Tiselius electrophoretic apparatus is not found to be correct.

B. G. P. SHAFIROFF, M.D.

ANTISEPTIC SURGERY; TREATMENT OF WOUNDS AND INFECTIONS

Kenney, W. E.: The Prognosis in Acute Hematogenous Osteomyelitis with and without Chemotherapy. *Surgery*, 1944, 16: 477.

The mortality in acute hematogenous osteomyelitis before chemotherapy was 23 per cent on the average, 46 per cent in the toxic cases, and about 3 per cent in the nontoxic cases. After sulfonamide therapy was introduced it was 3.5 per cent.

Previous to the use of the drug, early bone decompression was almost prohibited by the severe mortality. Yet early bone decompression yielded the best results from the standpoints of the later integrity of the bone and function of the limb.

Incision down to the bone, aspiration, or withholding operation either before or after the administration of sulfonamides has not given as satisfactory results as early bone decompression. The new drugs, by controlling the initial septicemia and that which may follow operative intervention, have not allowed safe, early procedures.

The sulfonamide drugs have not proved of value so far as the local pathological process is concerned. One must still depend upon operation for the best results.

This study has been based on the reported experiences of surgeons with 3,176 cases of acute hematogenous osteomyelitis.

BENJAMIN GOLDMAN, M.D.

Evans, D. G., Fuller, A. T., and Walker, J.: New Drugs Active in the Chemotherapy of Experimental Gas Gangrene. *Lancet*, Lond., 1944, 247: 523.

Two new drugs, p-methylsulfonylbenzamidine hydrochloride (V187) and p-methylsulfonylbenzylamine hydrochloride (V335), have been synthesized and found to have a potent local chemotherapeutic action in experimental gas-gangrene infections in guinea pigs. Their action is not inhibited by p-aminobenzoic acid.

An extended study of V187 has demonstrated its effectiveness against clostridium welchii, oedematiens, and septicum infections. It is well tolerated when given intramuscularly in therapeutic doses. In vitro and in the mouse, V187 is as effective against sulfanilamide-resistant streptococci as it is against sulfanilamide-sensitive strains.

In guinea pigs, V187 is rapidly absorbed and excreted after intramuscular and intraperitoneal administration. Given orally, it is but poorly absorbed.

HAROLD C. OCHSNER, M.D.

Tate, B. C., and Klorfajn, I.: Sulfonamide Dermatitis; Further Observations. With Special Reference to Treatment and Prevention. *Lancet*, Lond., 1944, 247: 553.

In a previous article the author described epidermal sensitization caused by the local application of sulfonamides to the skin. A procedure for desensitization was outlined, but the attendant reactions were often extremely severe. The method has now been modified so that complete desensitization is achieved with a minimum of discomfort. A means of preventing this type of sensitization has also been devised. Nearly all of the authors' patients were sensitized originally to sulfanilamide; possibly this drug produces a wider range of sensitization than sulfathiazole.

The original procedure was to give relatively large doses by mouth, daily, and continue giving them in spite of the resulting eczema until the reaction subsided. It became apparent, however, that the quantity of drug required varied with the degree and extent of sensitization; and it was also found that there is a threshold dose for each patient below which no reaction occurs, and amounts slightly in excess of this produce only mild symptoms. Therefore, it seemed probable that a dose between the minimum threshold dose and that producing a maximum reaction would desensitize with little discomfort to the patient, provided treatment were sufficiently prolonged. Experience has confirmed this supposition, and the method has been successfully employed in 30 cases.

The correlation between the degree of sensitization and the quantity of drug required was more apparent with the intermediate doses than when large doses were employed. A point of equal importance is the duration of treatment, e.g., 3.0 gm. spread evenly over two or three weeks produce far more complete desensitization than a larger dose given in one day.

Treatment should not be started until any eruption from previous contact with, or administration of, the drug has disappeared; otherwise, symptoms may be unnecessarily severe. Exposure to direct sunshine may greatly aggravate the reaction and must be avoided. A check on the leucocyte count is, of course, advisable.

If desensitization results from neutralization of the antibody, it should be possible to prevent sensitization by using up the antibody as fast as it is formed. It should, indeed, be safe to apply the drug locally, provided it is given simultaneously by mouth in adequate doses; this hypothesis can be proved only by treating sensitized patients in this manner.

The phenomena of this type of sensitization are most easily explained, although the explanation is not necessarily correct, by the assumption that some new substance is formed by the epidermis to which it remains fixed. In accordance with common usage this hypothetical substance has been called antibody.

Desensitization presumably results from neutralization of the antibody with allergen. Strongly supporting this hypothesis is the correlation between the degree of sensitization and the quantity of allergen required for desensitization; and, more conclusive still, the disappearance of sulfanilamide from the blood after its administration to a sensitized patient. However, resensitization and reappearance of the drug in the blood after too brief treatment show that the reaction between allergen and antibody (simple neutralization as between acids and bases) is a reversible one which is governed by the law of mass action, the products of which are only slowly eliminated.

The time required for excretion of the allergen-antibody compound seems to be about fourteen days, because, for complete desensitization, this is the period over which, it has been observed, the drug must be continued after a large increase of dose has failed to cause symptoms—i.e., presumably after the whole of the antibody has been neutralized. The rate of this excretion may vary in different subjects; hence, the authors have insisted on a final test of one large dose.

The constitutional symptoms which accompanied desensitization in some cases (rigors, raised temperatures, fainting, blood changes) are essentially manifestations of anaphylactic shock. Their occurrence does not mean, however, that other organs besides the epidermis were sensitized.

Although no evidence of systemic sensitization has so far been encountered, there is no guarantee that it will not develop, and the question arises whether this risk should be taken. For most infective dermatoses, local sulfonamide therapy is not superior to other methods of treatment in the

authors' experience, but there are instances in which it seems to be of great value; and since the main objection to it has been removed by preventive oral therapy, its employment in carefully selected cases is considered justifiable.

The statements in this article are confined to epidermal sensitization to the sulfonamides, but the method of desensitization has proved equally successful in acriflavine and boric-acid dermatitis. The authors believe that the principles mentioned are applicable to the wider field of allergy in general.

JOHN E. KIRKPATRICK, M.D.

Vilter, C. F., and Blankenhorn, M. A.: The Toxic Reactions of the Newer Sulfonamides. *J. Am. M. Ass.*, 1944, 126: 691.

In the past four years 1,936 patients in the medical wards at the Cincinnati General Hospital have been treated with sulfathiazole, sulfadiazine, sulfapyrazine, sulfaguanidine and succinylsulfathiazole. Sulfapyridine is now considered obsolete and is no longer used in this service; sulfanilamide is rarely employed, and only a preliminary report can be given on sulfamerazine, since its use has been recent. This particular study was undertaken to determine the relative incidence of untoward reactions to the various drugs and the relation of the mild and readily recognizable symptoms to severely toxic or lethal reactions. Difficulties were encountered in this evaluation because many patients admitted to this service are critically ill as the result of acute infection, or they are in a moribund state of chronic disease, and thus the differentiation of symptoms due to drug from those due to disease is difficult. Also, the drug is usually discontinued at the first sign suggestive of sulfonamide toxicity. Consequently, the course from early and mild to late and severe symptoms can rarely be followed.

Unfortunately, there is no absolute method, short of discontinuing the sulfonamide, of differentiating such fever from that produced by the infection for which the drug is given. Frequently, however, there are clinical signs of resolution of the infection, or one is aided by the appearance of skin manifestations.

Skin lesions usually appear between the second and tenth days. Sulfathiazole usually produces a tender erythema nodosum, most frequently found on the extensor surfaces of the extremities and on the face. Sulfathiazole may also produce a morbilliform erythematous rash, either localized or widespread. The skin lesions may become pustular with continued administration of the drug.

Conjunctivitis, frequently associated with erythema nodosum, occurred only in patients treated with sulfathiazole. It occurred between the fifth and fourteenth days and was bilateral in all but 1 case. The erythema and moderate edema of the bulbar conjunctiva may be accompanied by burning of the eyes and photophobia.

Nausea and vomiting, distressing symptoms that contributed to the discarding of sulfapyridine, occur infrequently with sulfathiazole and rarely with sulfadiazine. They usually appear after the first dose of the drug, in contrast to similar symptoms which may appear later as a result of uremia due to sulfonamide nephrosis or tubular obstruction. It is usually possible to change immediately to another sulfonamide with prompt relief of the emeses.

Polyneuritis, which is usually asymmetrical, has a remarkably high incidence. Its onset with pains, burning, numbness, or tingling has occurred as early as the seventh day of treatment and perhaps as late as six months after a course of sulfonamide.

Delirium is difficult to attribute to sulfonamides, since it occurs so frequently in febrile disorders. As a rule, it occurs in association with other toxic manifestations of the drugs, particularly renal complications.

Polyarthritis and arthralgia appeared in a small number of the cases between the second and twelfth days.

Alterations in the blood and bone marrow were noted 11 times with sulfathiazole, once with sulfapyrazine, and not at all with sulfadiazine. These reactions may occur at any time in the course of therapy. Leucopenia gives no clinical sign. Thrombocytopenia is, of course, usually associated with hemorrhagic phenomena; hemolytic anemia with jaundice; and agranulocytosis with dirty ulcerations of the mouth and pharynx. None of the toxic symptoms are of particularly deadly portent. Most of them disappear within one or two days after discontinuance of the sulfonamide, except that neuritis may not. Leucopenia may disappear even while treatment with the sulfonamide continues. When the onset of peripheral neuritis occurs during treatment, the necessity of treatment must be weighed against the possibility of a persistent neuritis after recovery. Thiamine has not cured or prevented this form of neuritis.

The most troublesome toxic symptoms center about the kidney and the urinary tract. These have been the most dangerous to the patient and most difficult to diagnose in the early stages. They appear in two separate forms but may overlap. The one is mechanical obstruction of the renal pelvis or ureter by crystals; the other is injury of the secreting portion of the kidney.

Sulfonamide nephrosis, characterized by drug retention and a rising blood-urea nitrogen may or may not be accompanied by oliguria and anuria and by albuminuria. It has occurred in patients receiving sodium bicarbonate. It may occur in conjunction with a systemic picture of encephalopathy, myocarditis, hepatitis, anemia, leucocytosis, and fever, and is readily confused with Weil's disease when the history of sulfonamide ingestion is lacking. It appeared in 10 of the cases collected and the smallest dose of drug (sulfathiazole) was 6 gm. The authors noted regularly between the first and fifth days that the first manifestation was a rising blood-urea nitrogen level.

The treatment of renal complications must suit the individual case. Because of the frequency with

which renal complications occur, daily determinations of the fluid intake and urinary output, and frequent examinations of the urine for erythrocytes and of the blood for the drug level and nonprotein nitrogen should be routine procedures. For hematuria the urine should be alkalized promptly by the administration of sodium bicarbonate and fluids should be administered to bring the urinary output to at least 1,200 cc. per day. If oliguria or retention of drug or nonprotein nitrogen develops, the fluid intake should be increased, but if improvement does not result the drug should be discontinued. Ureteral catheterization is indicated if anuria is preceded by hematuria and renal colic.

The value of routine alkali treatment concomitant with the sulfonamides is still open to question. Although it is true that sulfonamides are more soluble in alkaline solutions and, consequently, might have less opportunity of depositing themselves in the genitourinary tract, the increased rate of excretion tends to reduce the blood level of the sulfonamide to below effective range.

With advanced age and renal disease, sulfonamides should be prescribed cautiously and the treatment followed carefully. With the onset of persistent hematuria, decreased urine output, signs of azotemia, and unusually high levels of sulfonamide in the blood, or of any one of these manifestations, treatment should carefully be discontinued.

It is obvious that the early signs of severe reactions are so occult as to be revealed usually only by laboratory studies. There is nothing, unfortunately, that bedside appraisal of the patient will yield in the early diagnosis of the fatal sulfonamide reaction.

BENJAMIN GOLDMAN, M.D.

Lyons, C.: The Re-Evaluation of Sulfa Drugs. *Mil. Surgeon*, 1944, 95: 301.

The toxic reactions from sulfonamides have complicated but have not seriously limited treatment.

It is unlikely that new sulfonamides will be more bacteriostatic than the presently available drugs, but less toxic compounds may be anticipated.

Prophylactic therapy has prevented invasive systemic infection and minimized the "spread" of local infections. This success suggests the oral or parenteral route as a method of choice.

Good clinical evidence for or against the continued local use of sulfonamide preparations in wounds is not available. Rapid absorption after intraperitoneal application makes it difficult to evaluate the abdominal cases in terms of local therapy. Considerable doubt prevails about the value of sulfonamides in the prophylaxis of gas gangrene. A distinct trend away from local sulfonamide therapy exists, but individual preference and opinion continue to guide such practice.

General hospitals in this country are receiving casualties with chronic infections associated with retained sequestra or foreign bodies. These infections are sulfa-resistant and many of the patients are sulfa-sensitive. The associated debilitated state contraindicates intensive sulfa therapy. Such cases are more often surgical failures than sulfonamide failures, but they represent a group of infections requiring some form of antibacterial therapy other than that with sulfonamides. The need for continued study of surgical infections is evident.

JOSEPH GASTER, M.D.

Bigger, J. W.: The Treatment of Staphylococcal Infections with Penicillin by Intermittent Sterilization. *Lancet*, Lond., 1944, 247: 497.

Experimental evidence is presented to show that penicillin, although bactericidal, failed to sterilize completely broth cultures of the staphylococcus pyogenes. This can be accounted for on the basis of a constant proportion of cocci which are insensitive to penicillin. The latter are characterized as persisters because of a temporary resistance to penicillin while they are in a dormant nondividing phase. However, dormancy lasts for a few days and with resumption of bacterial division, the organisms again become susceptible to the action of penicillin and are destroyed by it.

Clinical evidence also suggests that the same process takes place in vivo. In cases of staphylococcal osteomyelitis treated with penicillin, there may be a return of activity of the disease after treatment is stopped. This may be accounted for on the basis of the survival of persisters in the infective focus which begin to multiply after the bacteriostatic action of penicillin is stopped. Polymorphonuclear leucocytes can destroy such persister cocci only slowly.

A fractional or intermittent method of sterilization is recommended to destroy all the bacteria over a period of nineteen days. This method provides for the maintenance of ½ to 1 unit of penicillin per cubic centimeter of the patient's serum and requires 400,000 units of penicillin per twenty-four-hour treatment period. The plan provides for a first treatment period of four days, followed by an intermission of one day and four other treatment periods, each of two days with intermission periods of one day.

In order to obtain a prompt high concentration of penicillin, an intramuscular injection of 30,000 units should be given initially, together with a daily continuous intramuscular drip of 100 cc. of saline solution containing 400,000 units. This method of therapy does not preclude the surgical evacuation of collections of pus which serve as reservoirs of persisters. The author also suggests that the findings described are applicable to penicillin-sensitive, nonhemolytic streptococci. B. G. P. SHAFIROFF, M.D.

Coleman, R., and Sako, W.: The Treatment of Multiple Furunculosis with Penicillin. *J. Am. M. Ass.*, 1944, 126: 427.

The incidence of furunculosis superimposed upon miliaria is much increased during the warm summer weather. In the South, this condition constitutes a common problem which often proves to be very

refractory to treatment. A remarkably rapid response of multiple furunculosis to intramuscular penicillin therapy has been observed in 6 young children. Histories of the 6 cases are reported.

SAMUEL KAHN, M.D.

McKissock, W., Logue, V., and Bartholomew, I.: The Need for Asepsis in Local Penicillin Therapy. *Brit. M. J.*, 1944, 2: 551.

A study of the Preliminary Report to the War Office and Medical Research Council on Pencillin by Florey and Cairns in 1943 reveals that Gram-negative organisms have been found in the discharge from penicillin-treated wounds. In some cases such organisms as the bacterium coli, proteus vulgaris, and pseudomonas pyocyaneus have been grown from the aspirate from wounds receiving local injections of penicillin solution, and in others they have been cultured from pus issuing from similar wounds before healing was complete. Often enough the presence of such organisms, either in aspirated fluid or in purulent discharge, appeared to cause no serious complication or to delay healing unduly. The bacteriological results usually showed that after two days of treatment of the brain cavity with penicillin, Gram-positive cocci were no longer found in the fluid sucked or discharged from the wound, but organisms of the coliform group were almost invariably present. In wounds which remained completely closed this state of affairs persisted until healing was complete. Such Gram-negative organisms are present in the wound initially but are overgrown by staphylococci and streptococci in first cultures. Their presence is but another example of added hospital- or cross-infection of wounds.

The opportunity for cross-infection of a wound undergoing treatment with penicillin solution is particularly good. A rubber tube runs from the outside air to the depths of the wound, and through this channel injections of the penicillin solution are made, usually twice daily, for a period of from three to five days.

Three main points may be responsible for the very low rate of hospital- or cross-infection of wounds: (1) the care taken in closing scalp wounds to obtain very early healing; (2) the insistence upon very careful ward and dressing technique; and (3) an aseptic cap used to close the penicillin tube.

The incidence of potential cross-infection was 3 cases among 20 in the unit's original surroundings, but no clinical cross-infection occurred. In a second series, under less perfect conditions, the potential rate rose to 7 cases among 20 (35 per cent), and 1 superficial case of clinical hospital infection resulted (5 per cent).

HARRY W. FINK, M.D.

Criep, L. H.: Allergy to Penicillin. *J. Am. M. Ass.*, 1944, 126: 429.

A case of penicillin allergy, manifested by generalized severe urticaria, and studied from the point of view of the possible immunology involved, is reported.

This allergy, in all probability, is not unlike that of serum allergy. As is the case in other instances of sensitization to biological products, such as insulin, the posterior lobe of the pituitary gland, and liver extract, the reaction occurred after the resumption of treatment following a period without treatment.

There seems to be evidence of the presence of some immune substances in the serum of the patient, such as reagins and precipitins. This is proved by the positive direct skin test, by the positive passive transfer, and the positive precipitin test. What role, if any, these antibodies might have in mediating the reaction is not exactly clear.

The allergy to penicillin is probably unrelated to sensitivity to penicillium spores.

SAMUEL KAHN, M.D.

Bloomfield, A. L., Kirby, W. M., and Armstrong, C. D.: A Study of "Penicillin Failures." *J. Am. M. Ass.*, 1944, 126: 685.

From an intensive study of more than 100 patients treated with penicillin, a good deal has been learned about what might be called "penicillin failures," and it is with this phase of the subject that the present article is concerned. Penicillin failures may be discussed under the following headings:

1. Causes of death in penicillin-treated patients.
2. Failures due to inadequate amounts of penicillin.
3. Failures due to inadequate surgical drainage in penicillin-treated cases.
4. Failures due to overwhelming infection even when penicillin dosage was presumably adequate.
5. Failure to prevent or cure renal lesions in penicillin-treated cases of streptococcal infection.
6. Conditions in which penicillin either fails or is likely to be inadequate.

1. Causes of death in penicillin-treated cases. Aside from patients not seriously ill, 87 instances of severe infection, including endocarditis, meningitis, and acute osteomyelitis, have been treated. Of this series 7 or 8 per cent terminated fatally. It appears that only 2 deaths, or 2.3 per cent, of the whole series could be ascribed to the actual failure of penicillin treatment. Ten years ago one would have had a mortality of at least 50 per cent.

2. Failures due to insufficient penicillin therapy. Excellent results have been reported with relatively small quantities of the material, but this does not rule out the need of larger doses in some cases. At any rate, the unsatisfactory results in the reported series seemed to be ascribable to too small amounts of penicillin or to treatment of too brief duration.

It seems clear that with any serious infection it may be well to continue treatment for several days after the process has been controlled as a possible insurance against recurrence. This applies especially to staphylococcal and streptococcal infections. In subacute bacterial endocarditis due to the streptococcus viridans the good results which were obtained in a consecutive series of 9 cases seemed to be due to the continuation of uninterrupted treat-

ment over a period of from six to eight weeks. Recurrences of acute hemolytic streptococcal throat infections, common with brief treatment, can be prevented by giving penicillin over a period of from five to ten days.

An analysis of 8 cases of acute osteomyelitis of the long bones in which no operation was done indicates that very intensive and prolonged therapy is necessary if serious changes are to be prevented. Even then, the roentgenograms from the second week on usually show some absorption of the cortex with periosteal reaction, possibly due to injury which began before penicillin therapy was started. Some staphylococci must be sealed in and be difficult to reach in areas made relatively avascular by thrombosis and necrosis. Prolonged uninterruped treatment is clearly indicated in acute osteomyelitis.

3. Failures associated with penicillin therapy when adequate surgical drainage of infections was not carried out. In spite of the great efficacy of penicillin in controlling certain types of infection, the principle that evacuation of closed collections of pus is necessary for rapid cure still holds good in most cases. Simple aspiration of pneumococcal empyema and of gonococcal joints, with the injection of penicillin, has been adequate in many cases, but in other infections, especially those due to staphylococci and nonhemolytic streptococci, progress may be arrested until surgical drainage has been instituted.

4. Failures due to overwhelming infection. One patient provided the only example of failure of penicillin due simply to an overwhelming infection with an organism sensitive in vitro. She received large doses of penicillin by continuous intravenous drip, sufficient to raise the blood content to well over the standard bacteriostatic level of 0.15 unit per cubic centimeter. In spite of this the blood stream was not cleared and after twenty hours culture still yielded 130 colonies of staphylococcus aureus per cubic centimeter. The importance of using penicillinase is also brought out, as there was enough penicillin in the blood to inhibit growth in a blood culture made without penicillinase.

5. Failure to prevent or cure the development of glomerular nephritis in certain patients with streptococcic infections treated with penicillin. The association of glomerulonephritis with certain types of streptococcal infection is clearly established. When penicillin became available it seemed of particular importance to find out if this agent, which extirpates so many streptococcal infections with great speed, would prevent the occurrence of nephritis. Of no less interest was the question of whether nephritis already established would clear up after the elimination of concomitant streptococcal infection by penicillin, as for example in bacterial endocarditis.

There is no evidence that the course of nephritis is influenced, but every reason to believe that when an irreversible lesion has been set up it will progress in the usual relentless fashion of chronic glomerulonephritis. Similar observations by one of the authors (C.D.A.) in cases of bacterial endocarditis due to the streptococcus viridans have shown that the renal lesion may persist after the infection has been eliminated. All this is in harmony with the evidence accumulated by Addis to the effect that glomerular nephritis, once under way, tends to propagate itself.

6. Conditions in which penicillin either fails or is likely to be inadequate.

Pneumococcal meningitis—Although pneumococci are often highly sensitive to penicillin, the results of treatment of pneumococcic meningitis have been unsatisfactory in many ways. These poor results are doubtless attributable in some degree to the nature of this infection with its well known tendency toward adhesive arachnoiditis, encephalitis, and thick gelatinous exudate, which impedes the local application of any therapeutic agent. Since sulfonamides are quite effective in pneumococcal meningitis, it may turn out that sulfonamides together with penicillin may be the best treatment.

Chronic (staphylococcal) osteomyelitis—In contrast to the results in acute staphylococcal osteomyelitis, the results in most of the chronic cases have been unsatisfactory. If the lesion is in a long bone and can be laid wide open by surgical means, local penicillin irrigations seem to aid in rapid healing. In cases with sinuses leading into the pelvic bones or into the spine (inaccessible to surgery), neither local irrigations nor heavy intramuscular injections have had any definite effect.

7. Conditions in which penicillin was entirely ineffective:

Tuberculous paravertebral abscess (no effect)

Lymphoid leucemia (no effect)

Aleucemic myeloid leucemia (no effect)

Infectious mononucleosis (no effect). (This condition developed in a patient with acute osteomyelitis while under active penicillin treatment.)

Mycosis fungoides (no effect)

Chronic (rheumatoid) arthritis (no effect)

Filariasis (no effect). (The blood count of the microfilariae remained unchanged during the penicillin administration.)

8. Relation of penicillin failure to the sensitivity of strains in vitro. Even within categories of bacteria such as streptococci and staphylococci, and others which are in general sensitive to penicillin, there may be strains which are resistant in vitro. It is evident that failure of therapy in an individual case may be due to strain resistance and the need of in-vitro tests in routine work is emphasized.

BENJAMIN GOLDMAN, M.D.

ANESTHESIA

Arrowood, J. G., and Foldes, F. F.: Subarachnoid Analgesia Maintained by the Continuous Drop Method. *Arch. Surg.*, 1944, 49: 241.

The authors describe a technique for the continuous drop method for maintaining subarachnoid

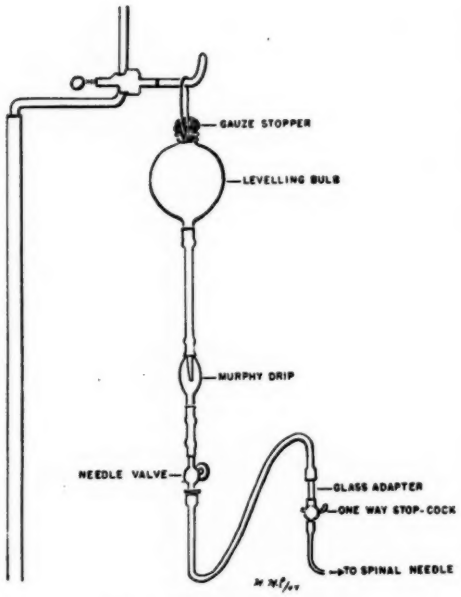

Fig. 1. Diagram of apparatus.

analgesia. The equipment consists of a 250 cc. leveling flask and tube set with a Murphy dropper, a regulating valve, and a glass adapter. The initial dose of anesthesia is given in the same manner as would be used with the fractional method of administration.

The apparatus is then hooked up to the malleable spinal needle. Analgesia is maintained by the drop method. The leveling flask containing 0.5 per cent procaine hydrochloride solution is suspended from 60 to 80 cm. above the level of the spinal needle. About twenty minutes after the initial dose, approximately 40 drops of 0.5 procaine solution are permitted to run in. The valve is then carefully regulated so as to deliver the desired number of drops, which may vary from 4 drops per minute on up.

Twenty-seven consecutive cases are summarized in table form with details as to the dosage given, the adjuvant anesthesia, and the duration of the operation.

It is believed that this more sensitive method of giving continuous spinal anesthesia will maintain the necessary level of analgesia from moment to moment and will keep the concentration of the drug in the spinal fluid at a minimum at all times. It also provides a perfectly aseptic technique, for once connected, the system can be kept completely closed at all times.

The safety of the technique depends on its meticulous application and upon expert observation and management of the patient. It is advised, therefore, that it be used only by the experienced spinal anesthetist who can give it his undivided attention.

MARY KARP, M.D.

PHYSICOCHEMICAL METHODS IN SURGERY

ROENTGENOLOGY

Wyatt, G. M., and Spurling, R. G.: Pantopaque. *Surgery*, 1944, 16: 561.

Pantopaque is the contrast medium of choice for myelography. It is preferable to lipiodol in that it is more readily absorbed and does not remain in the subarachnoid space as a persistent foreign substance. Also, it is nontoxic; more fluid than viscous (therefore, it fills out the smaller dural nerve sheaths); more easily removed; and it is no more irritating than lipiodol. The sharp roentgenographic contrast which it affords renders it superior to the gases.

The authors were impressed with the rapid absorption of pantopaque, which is its chief advantage. Six patients from whom pantopaque was incompletely removed were studied. The entire spine and skull were observed roentgenologically at time intervals varying from one to fifteen months. Absorption was more rapid during the first few months and was retarded over the remaining period; eventually, absorption was almost complete.

It is believed that the variability in the rate of absorption may be due to the nature of the contrast medium, which is a mixture of isomers. Another factor in favor of rapid absorption is the emulsifying action of body motion on larger collections (0.5 cc.) of pantopaque. The medium produces a tissue reaction similar to that of lipiodol; when observed after a few months, the material was fixed in position. However, none of the patients complained of symptoms that could be referred to the residual pantopaque.

MAURICE D. SACHS, M.D.

Hodson, C. J.: Four Primary Roentgenological Lesions Found In Traumatic Chest Cases. A Preliminary Report. *Brit. J. Radiol.*, 1944, 17: 296.

Two hundred and fifty thoracic casualties received from within one to twenty-one days after wounding were examined in a thoracic unit in the Mediterranean theater of war.

In 12 cases, radiopaque linear shadows were found traversing the lung along the path of the missile. In the early stages, whatever the shape of the lesions, they present hazy and ill-defined margins and are often so faint as to be barely visible on the film. In time there is a characteristic change in appearance, and at the end of two or three weeks these lesions show plainly as clear-cut linear, oval, or rounded shadows, from 0.5 to 1.5 cm. in length, leading across the lung field to a foreign body or a secondarily damaged rib at the other end. Coincident with this greater clarity of definition is an increase in the density of the shadows. The course is typical over a period of weeks. The lesions slowly become narrower and more opaque until they are lost to sight. When viewed at right angles, these tracks show as definite bands along the course of the missile, but when seen end-on or obliquely, they become foreshortened and appear as small oval or rounded shadows suggestive of hematomas or abscesses of the lung. These lesions are similar in nature to missile tracks in other tissue. Postmortem examination in 1 such case showed the lung tissue to be torn along the path of the missile with hemorrhage into the space so formed. Around this central core of blood was a more widely spread area of solid lung, due to ecchymosis and edema of the parenchyma which merged gradually into normal tissue. Presumably, as the lesion heals, the ecchymosis and edema are absorbed, and this more solid central core is left to organize, which results in a tough fibrous band firmly attached to surrounding structures. One practical point of value of these tracks is that (in 3 cases) they have led to the discovery of foreign bodies otherwise invisible behind the heart or under an effusion.

In 6 cases, a different variety of "track" was observed. Associated in every case with an entry wound and bone damage at one end and a foreign body or exit wound at the other, were found 2 roughly parallel linear shadows traversing the lung. In the 3 cases in which these could be viewed "end-on" an air-containing hole was seen. The presence of varying fluid levels in 4 of these cases and the marked resemblance of a tuberculous cavity in 1 suggested that air-containing missile tracks were present.

In length, they vary from 4 to 10 cm.; in width, from 0.2 to 2 cm. Their walls may appear to be from 2 to 3 mm. thick or practically invisible; their caliber varies slightly along their course, but on the whole they are "digitate" rather than "fusiform." They tend to end abruptly about 1 or 2 cm. from the parieties or the foreign body. When viewed "end-on" they may appear rounded or oval and may resemble a tuberculous cavity or small lung abscesses. These cavities slowly heal by closing up from side to side over a period of weeks. The period during which they were under observation varied from eighteen to thirty-six days. There was no characteristic symptomatology. The significance of these lesions appears to be chiefly in the problem of their recognition and their differential diagnosis from a tuberculous lesion.

Extrapleural hematomas have been found around rib fractures, and in cases in which foreign bodies have come to rest in, or just inside of, the plane of the ribs. They consist of blood which has collected between the intercostal muscles, on the one hand, and the parietal pleura, on the other; stripping of the pleura from the parieties results, with its indentation into the lung parenchyma as the covering to a rounded hematoma. At operation the pleura has been found to be firmly adherent to the chest wall at the periphery of the lesion.

The roentgenological appearance is of a rather dense, rounded shadow arising from the chest wall. It may arise gradually or steeply at its edges, and sometimes it overhangs at its lower border, giving almost a pedunculated appearance. When viewed at right angles to the plane of its base, it often has, especially when a week or two old, a sharply defined border resembling a cyst. In size these lesions vary from 2 or 3 to 10 or 15 cm. in diameter; 1 lesion projected 7 cm. into the lung substance. They may occur anywhere over the chest wall, but are usually visible only in the upper chest. In 4 cases there were four or more fluid levels, and in 2 cases there were also small intrapleural effusions on the same side. The contents of these lesions may be fluid, clotted or infected blood, and the gas they contain arises presumably from contact with the exterior or from gas-forming organisms. In 4 of the cases at operation a foreign body was found to be lying within the lesion's limits, with or without bone fragments from rib damage. These lesions slowly resolve over a period of weeks, gradually subsiding to the chest wall, until they appear only as "thickened pleura." The duration of this process is from four to eight weeks, according to the size of the lesion. Such a process may become infected, and if this occurs, the area can be drained without involving the pleural cavity, and the danger of empyema is thus avoided.

Lung contusion is a name given tentatively to the diffuse shadow found in so many traumatic chest cases when there is no evidence of pleural effusion to account for this change in density. It occurs in almost any type of lesion, but is most striking in cases of chest-wall injury when penetration of the pleura or parenchyma does not appear to have occurred. It may be associated with severe blows on the chest and with close-up explosions, such as the detonation of cartridges carried in the patient's clothing, without penetrating injury.

The etiology of this condition would appear to be similar to a blast effect. An early "clouded" appearance of the lung parenchyma is produced, which clears in the course of a few days; occasionally the condition resembles an inflammation due to pleural effusion.

HAROLD C. OCHSNER, M.D.

Rackow, A. M.: Some Problems of Appendix Radiology. *Brit. J. Radiol.*, 1944, 17: 265.

Roentgenography of the appendix is usually either neglected or abused. Although frequently the radiologist is called upon to render an opinion pertaining to the appendix, actually, little has been written concerning the roentgenographic appearance of the normal appendix.

The appendix can be visualized by a follow-through barium meal or barium enema; most authorities prefer the former. The mode of filling the appendix is passive but emptying is accomplished by contraction. In the past, too much importance has been placed on the nonemptying of the appendix within twenty-four hours. Appendical barium retention may be caused by dehydration and caking of the barium which produce concretions that are gradually expelled. A nonfilling appendix need not be due to pathology; it may be that during the examination period no barium was present nor had been expelled.

The author has adopted the following routine:

In the morning, a follow-through barium meal is given. From two to three hours later, the patient is given 2 drachms of magnesium sulfate. The cathartic seems to stimulate appendical activity. Twelve hours later, a second follow-through barium meal is given. It is probable that the second dose of barium will remain somewhat longer in the cecum after the effects of the magnesium sulfate have worn off and thus an opaque filling of the relaxed appendix will be provided. This method was successful in 76 per cent of the cases in which it was tried (25 of 33) as compared to success with one barium meal in 41 per cent (16 of 39).

The form and position of the appendix vary, and the width of the lumen is variable. An indication of pathology is irregularity rather than total width. Segmentation may be due to local constrictions or to subdivisions of the barium caused by fecal particles. Neither is pathological. However, if local constriction is constant, it should be regarded with suspicion. A curled appendix may be due to a short mesoappendix. If the tip of the appendix is adherent to the iliopsoas muscle, pull on the cecum stretches the appendix and causes pain. Local tenderness may be deceiving because some physicians have an unconscious tendency to use more pressure when palpating over McBurney's point.

The author thinks that more attention should be paid by radiologists to appendical pathology. One way of learning more in this field could be realized by examining a series and establishing a normal criterion.

MAURICE D. SACHS, M.D.

Copleman, B.: The Roentgenographic Diagnosis of the Small Central Protruded Intervertebral Disc; Including a Discussion of the Use of Pantopaque as a Myelographic Medium. *Am. J. Roentg.*, 1944, 52: 245.

The practice of the Neurosurgical Section of the Army Hospital with which the author is affiliated has been to request a myelographic examination in every case of suspected protruded intervertebral disc in which the lesion has been incident to Army service. As a result, 150 cases were examined by means of myelography in slightly more than a year, 86 of which were operated upon.

The many advantages of myelography are well known. In the author's series, however, there were 5 cases in which very small midline protrusions of the intervertebral discs were detected by a most careful application of such a procedure and therefore their publication appears worth while.

The general technique of procedure is as follows:

The patient is placed in the lateral recumbent position, as usually applied for lumbar puncture, on a roentgenographico-roentgenoscopic tilt table and,

after local anesthesia with novocain solution, a lumbar puncture needle is inserted into the third or, occasionally, the second lumbar interspace. When a free flow of spinal fluid is obtained, 3 cc. of pantopaque are injected firmly and steadily so as to obtain a solid column of opaque medium. The stilet of the needle is then replaced and the patient turned slowly on his stomach. The table is now tilted and the advancing margin of the opaque column is watched for deformities until the third lumbar interspace is bridged. If slight persisting deformities are observed, "spot" roentgenograms are made. The table is tilted still further and the fourth and fifth lumbosacral discs and the cul-de-sac are investigated roentgenoscopically and by "spot" roentgenograms. The column is then allowed to ascend the lumbar spine and additional careful studies are made. Finally, the patient is turned into the prone position, the opaque column is maneuvered (by tilting the table) beneath the needle, and the opaque medium is withdrawn.

As a rule, only the last three interspaces are examined, but when the clinical examination indicates, the upper segments of the spine are also investigated. The roentgenograms are made with the roentgenoscopic tube and a "spot" film device, usually in the anteroposterior and moderately oblique views.

By following this procedure the author was able to discover in the 5 cases mentioned, very small central disc protrusions, whereas otherwise the condition might have been missed. It is important that in such cases the edge of the opaque column be allowed to advance slowly and gradually so that the outline of small protrusions be visualized before the bulk of the opaque substance obscures it. The 5 cases are briefly reviewed and their instructive roentgenograms reproduced. In all of the cases there was considerable pain which was completely relieved after removal of the protruding discs.

The author is of the opinion that the roentgen demonstration of these lesions was greatly facilitated by the use of pantopaque, a new opaque myelographic medium introduced during the past two years. The advantages of pantopaque are several. It is a freely flowing oily substance with less tendency to break up into globules than lipiodol; it casts an excellent shadow but does not obscure fine gradations of density, and, above all, it is nontoxic. In all but 1 of the patients in whom the opaque material has been allowed to remain, no ill effects of any kind were observed. The author cannot attest to the absorbability of the drug since his longest observations started only six months ago, but it is said that pantopaque absorbs slowly (about 1 cc. a year).

T. LEUCUTIA, M.D.

Gianturco, C.: A Roentgen Analysis of the Motion of the Lower Lumbar Vertebrae in Normal Individuals and in Patients with Low Back Pain. *Am. J. Roentg.*, 1944, 52: 261.

The normal movements of the spine are connected with several factors, including muscular pull, load upon the discs, intranuclear pressure, and the condition of the articular facets. These factors vary with various segments of the spine and are altered by certain pathological conditions. It occurred to the author a little over a year ago that some advantage may be derived from a roentgen study of the pattern of motion of the various vertebral segments. With this view in mind, he devised a method which permits such a study.

The method consists in the taking of 3 roentgenograms of the lumbosacral spine in the lateral position, one with the spine at rest, one with the spine in flexion, and one with the spine in extension. The patient is placed in a special seat constructed by the author so that the pelvis is immobilized during the actual process of roentgenography. By superimposition of the sacrum in the 3 roentgenograms, the shadows of the lower border of the fifth lumbar vertebra cross each in a definite manner. With the aid of an illuminator and sharp pointed pencil, straight lines are drawn tangential to the lower contour of the fifth lumbar vertebra marking these shadows. The point of intersection of the line in straight erect position and the line in flexion represents the fulcrum of flexion of the fifth lumbar vertebra, and the point of intersection of the line in straight erect position and the line in extension represents the fulcrum of extension of the fifth lumbar vertebra. The same procedure may be applied to the discs of the fourth and third lumbar vertebrae. So far no attempt has been made to extend the examination to segments above the third lumbar vertebra since a rather complicated device would be necessary for the taking of the roentgenograms above that level.

Obviously, the terms "fulcrum of flexion" and "fulcrum of extension," although descriptive, are not very accurate. The flat surface of the vertebral body as it slides over the turgid nuclear substance produces many intermediate points of crossing if roentgenograms in other degrees of flexion or extension are made. The points mentioned represent the two opposite extremes.

The author first applied the method to 20 normal individuals between the ages of nineteen and thirty-five years. In these, with a normal pattern of motion, the fulcra of flexion and extension of the third, fourth, and fifth lumbar discs were found to lie within very narrow limits at about the center of the nuclei. The average distance between the fulcra was 5 mm. with a minimum of 3 mm. and a maximum of 8 mm. The fulcrum of flexion was always anterior to the fulcrum of extension.

Then he studied 35 patients with low back pain. Twenty of these patients showed normal pattern of motion but in 15 there was deviation from the normal. The exact distribution of the lesions in all cases is shown in Table I.

In attempting to explain abnormal vertebral motion the author discusses the importance of the muscular action, the effect of the bony lesions, the behavior of the posterior articulations of the spine, and the influence of limited changes involving the

TABLE I.—DISTRIBUTION OF LESIONS

Normal motion: 20 cases (54%); without bone lesions, 16 cases; with bone lesions, 4 cases.		Abnormal motion: 15 cases (46%); without bone lesions, 9 cases; with bone lesions, 7 cases.	
Bone lesions found:	Cases	Bone lesions found:	Cases
Spondylolisthesis, grade 1	1	Spondylolisthesis, grade 2	2
Hypertrophic changes	1	Hypertrophic changes	1
Schmorl's nodes	2	Osteochondritis juvenilis	1
		Old compression fracture	1
		Unilateral sacralization of the fifth lumbar	2

intervertebral discs. It is fully realized that a great deal of investigation will be necessary to establish the exact anatomical basis for the various types of abnormal motion.

The fact that in a high percentage of patients with low back pain abnormal vertebral motion was found is significant. It is hoped that this will stimulate further research. T. LEUCUTIA, M.D.

Rhodes, A. W., and Borrelli, F. J.: Giant Hemangioendothelioma with Thrombocytopenic Purpura. *Am. J. Roentg.*, 1944, 52: 323.

Giant hemangioendothelioma with thrombocytopenic purpura is a rare entity. The literature reveals the report of only one other case.

In the present case, a tumor of the back and neck was noted at birth (November, 1941) and diagnosed as lipoma. Two months later, it began to increase in size with a blue discoloration. The tumor blanched on pressure. Petechiae and small areas of ecchymosis were present throughout the body. The tumor continued to increase in size and the patient was admitted to the hospital; vitamin K and multiple transfusions were given. In addition, 220 roentgens were given in one dose, with 140 kv. and 1 mm. of aluminum filter at 25 cm. distance, with no effect. The mass continued to increase in size and extended to the left side of the face and chin, involving the entire left thoracic wall. Hemorrhagic spots were noted around the base of the tongue, soft palate, fauces, and pharynx. The spleen was palpable. The hemoglobin was 9.2 gm.; the red blood cells numbered 3 million, the white blood cells 15,200, and the platelets 15,000; the coagulation time was four minutes and the bleeding time twenty-five minutes. Roentgenograms revealed a soft-tissue tumor of the chest and neck but no evidence of bone destruction.

On May 4, the patient became critically ill following an upper respiratory infection. Two courses of radiation therapy were given. The first course was given over a period of three weeks (from May 8 to June 1) and consisted of 10 treatments, 100 roentgens per treatment; 4 portals, from 7 by 7 cm. to 10 by 10 cm.; 140 kv., 3 mm. of aluminum filtration at 50 cm. tube-skin distance. Three hundred roentgens were given to the left lateral neck, 200 roentgens to the left shoulder (lateral port); 300 roentgens to the left shoulder (anteroposterior port) and 200 roentgens to the left shoulder (posteroanterior port). A slight change was noted and two weeks later a second course was given: 200 roentgens to each of the three ports. In August, a third course of irradiation was given: 160 kv., 25 cm. distance, open field, inherent filtration of 0.15 mm. of copper, 275 roentgens to the shoulder (posteroanterior field). The same dose was repeated two days and two weeks later, with a 20 by 20 cm. field at 50 cm. distance; and on October 22, 275 roentgens were again given with a 10 by 10 cm. field.

Response to radiation therapy was gratifying. Within two months, the mass regressed in size and the discoloration faded slowly. Biopsy report of the lesion was hemangioendothelioma. Observation one year later revealed that most of the skin looked normal except for a slight purplish discoloration of the arm due to recent bleeding, and the shoulder skin was roughened and red. Both areas were given a single dose of 275 roentgens. The bleeding time was four and one-half minutes and the clotting time one and one-half minutes; the platelets numbered 450,000 per cubic millimeter. When last seen, the purple areas had disappeared and the child was developing normally.

The authors raise one very pertinent point concerning the efficacy of radiation therapy: the involved fields were extensive; undoubtedly, the irradiation of the ribs and spleen underlying the tumor helped not only in the regression of the tumor but also in the elevation of the platelet count, which resulted in a lowering of the bleeding time and disappearance of the purpura.

MAURICE D. SACHS, M.D.

Cantril, S. T., and Buschke, F.: Roentgen Therapy in Gas-Bacillus Infection. Report of 9 Cases with Recovery. *Radiology*, 1944, 43: 333.

There appears to be considerable difference of opinion regarding the efficacy of irradiation in the treatment of gas gangrene. Opponents of this type of treatment state that animal experimentation has not been successful. Recently, however, Merritt described experimental gas gangrene in sheep, and it is the authors' belief that this report should answer the critics.

Nine cases of gas gangrene are reported in detail. The final results clearly demonstrate that x-ray therapy alone, or in conjunction with surgery, is very effective in the management of gas gangrene. (Emphasis is placed on the individuality of each case regarding surgery and irradiation.)

All 9 of these cases of gas-bacillus infection were due to trauma. Although there was no mortality in the series, the authors believe that it may not always be possible to maintain so low a mortality rate. They further believe that in all probability the long-term mortality rate will be similar to that of Kelly (11.2 per cent). Without doubt, a mortality of from 10 to 15 per cent is a very marked saving in lives.

Because of the extent of the trauma, amputation was necessary in 4 of the cases; in 3 of the 4 cases, x-ray therapy served to limit the infection and reduce toxemia, and the patients became better surgical risks for amputation. In the fourth instance, although the extent of trauma made immediate amputation unequivocal, there was a reduction in toxemia.

Four other patients received therapeutic doses of antitoxin. One had a severe serum reaction. The authors are of the opinion that these patients would have recovered regardless of whether or not the antitoxin had been used. Sulfonamides were effectively used in 2 cases with secondary bacterial infection after the gas-bacillus infection was under control and x-ray therapy had been discontinued. Chemotherapy was used in several other cases but the authors are convinced that this did not help in controlling the actual progress of the disease other than to combat secondary bacterial infection.

The authors conclude that the mortality from gas gangrene, whether in civilian or military life, can be minimized by thoughtful, diligent use of both surgery and roentgen-ray therapy.

MAURICE D. SACHS, M.D.

MISCELLANEOUS

Alexander, T. C.: Irradiation Pneumonitis. Report of a Case. *Bull. Johns Hopkins Hosp.*, 1944, 75: 199.

The author reports a case of Hodgkin's disease in which the patient died from pneumonitis as a result of overirradiation of the mediastinum and unprotected lungs.

The patient was treated from January to September, 1939, and he died on September 28, 1939. During this period he received the following amount of radiation over the mediastinum and adjacent lungs: from January 21 to March 1, a dose of 1,050 roentgens in air given in 10 fractions through a field 10 by 20 cm. over the mediastinum anteriorly, and a similar dose posteriorly; from April 26 to May 4, a dose of 420 roentgens in air given in 4 fractions through a field 10 by 20 cm. over the mediastinum anteriorly, and a similar dose posteriorly; from July 31 to August 17, a dose of 2,018 roentgens in air given in 10 fractions through a field 15 by 15 cm. over the mediastinum posteriorly, and a dose of 1,818 roentgens given in 9 fractions through a field 20 by 20 cm. over the mediastinum anteriorly; and, finally, from September 22 to September 28, a dose of 243 roentgens in air given in 3 fractions through a field 20 by 20 cm. over the mediastinum posteriorly. Thus, during eight months, a total of 7,019 roentgens in air was administered to the mediastinum through fields as described without any provision for shielding the lungs. The factors employed were: 200 kv.p., 20 ma., 50 cm. skin target distance, Thoraeus filter, 2 mm. of copper plus 1 mm. of aluminum.

The patient developed severe respiratory embarrassment with progressive cyanosis in the terminal stage, and a roentgenogram eight days prior to his death revealed an extensive pneumonitis. Postmortem examination showed pulmonary changes which were similar to those produced by overirradiation in experimental animals by Davis and described later by McIntosh and Spitz and by Warren and Spencer. No evidence of Hodgkin's tissue was found in the lung tissues. T. LEUCUTIA, M.D.

MISCELLANEOUS

CLINICAL ENTITIES—GENERAL PHYSIOLOGICAL CONDITIONS

Ladell, W. S., Waterlow, J. C., and Hudson, M. F.: Desert Climate; Physiological and Clinical Observations. *Lancet*, Lond., 1944, 247: 491.

Heat exhaustion of type 2 was seen almost exclusively in the second half of the summer. The incidence seems to be related not to the height of the temperature but to the duration of the hot weather. The most prominent symptom was defective sweating which was a complaint in 87 per cent of the cases. The duration of this symptom was short in some cases and as long as three weeks in others. A common symptom in this type of case was dyspnea, which was present in 23 of 55 cases, and was associated with numbness and tingling of the hands and feet in 8. Dyspnea and exhaustion were worse in the middle of the day. Often the subject felt fairly well in the early morning but symptoms began to come on at about 11 a.m. Vomiting and cramps were present in only 2 cases and were not severe. Increased frequency of urination was extremely common. Several patients said that the frequency started when sweating began to be defective. These patients did not look ill. There was slight tachycardia on admission. The pulse volume was also good. The mean systolic pressure lying down was 121 mm. Hg, which is nearly 20 mm. higher than the mean in controls at the same time of year. The diastolic pressure was quite variable with a mean of 69 mm. Hg. Many patients showed obvious and easily elicited capillary pulsation in the nail bed. The reaction to standing was normal. High temperatures are not found, and this is one of the features that differentiates this group from hyperpyrexial cases. Eighty per cent of the patients of this type had had severe or moderately severe prickly heat and this was characteristically in the scaling stage. The outstanding chemical feature of these cases was the excretion of large volumes of dilute urine. The greatest volumes of urine were recorded toward the end of the season. The only abnormalities found in the blood were reduced whole-blood chloride and reduced plasma chloride. Blood-urea levels were low.

All patients were encouraged to drink larger amounts of fluid. Salt by mouth in doses of ½ to 1 ounce were given to alternate cases. Progress in objective signs were slow. The average blood pressure on discharge was identical with that on admission. The low diastolic pressure and high pulse pressure noted in some cases often persisted for many days. The urine output remained high. The average weight gain in these patients during their stay in the hospital was 41 ounces, which was significantly less than the average gain of 121 ounces in those with heat exhaustion of type 1. Extra salt by mouth did not have any effect upon the amount or rate of gain in weight.

HAROLD C. OCHSNER, M.D.

Ladell, W. S., Waterlow, J. C., and Hudson, M. F.: Desert Climate; Physiological and Clinical Observations. *Lancet*, Lond., 1944, 247: 527.

An outline is made of observations in Shaiba in southern Iraq on British Army personnel during the summer of 1943. Maximum temperatures above 100° F. occurred daily for four months and there were two periods, one of a week and the other of a fortnight, when the temperature each day was above 115° F. The humidity was low and the climate was thus a true desert climate. Observations were made on 24 soldiers. The pulse rate of the subjects lying down remained constant throughout the summer at an average level of 65. At the beginning of the summer, the average blood pressure taken on subjects lying down was 112/72 mm. Hg. As the weather become hotter, the blood pressure gradually fell to a minimum of 97/62. Thereafter it rose again, but by the end of October it had not reached the initial level found in May. All the subjects lost weight in the hot weather and some of them lost as much as 7 per cent of their initial body weight. When the weather became cooler, they recovered weight. The volume of urine passed in twenty-four hours also fell as the weather got hotter. A low urine output was associated with a high blood urea. Dehydration was most probably the result of the insufficient intake of salt. It was found that those subjects who lost most weight had the greatest chloride concentration in their sweat. These observations suggest that there are certain individuals who have a higher salt requirement than the average. They react to high rates of sweating by cutting down salt loss in the urine to a minimum. The chloride content of the body fluid is kept up by a reduction in the total fluid volume shown by the loss in body weight.

Hyperpyrexia. Twelve patients were seen who had a rectal temperature of 107° F. or more. Of these 12, 9 were over thirty years of age, compared with 40 per cent over thirty in the whole series. Five of these cases occurred during the hottest week of the summer.

In most patients the onset was sudden. All except 1 gave a history that sweating stopped over a period varying from twenty-three days to half an hour before the attack. The main elements in the clinical findings were rectal temperature of 107 or more, a skin hot and dry to the touch all over the body, and partial or complete loss of consciousness. Abdominal and tendon reflexes were absent in only 3 cases. Blood samples showed diminished hemoglobin, and a chloride content in both the whole blood and the plasma which was slightly less than normal. The

blood-urea and plasma levels were within the limits found for controls. The sodium content, estimated on 2 samples only, was also normal. Although there was some chloride deficiency in the blood there was an apparent anomaly in that all these cases had chloride in the urine. Treatment was along established lines. The body temperature was reduced with wet sheets and fanning of the patients, who were than transferred to an air-conditioned ward with a temperature of about 80° F. Losses from rapid sweating were restored within twelve hours of the onset in most cases.

The laboratory findings fit in with the theory that the first breakdown is in the sweating mechanism. Recovery was rapid and uneventful.

Heat exhaustion type 1. The great majority of this type of cases were seen in the two hottest weeks of the summer. The history was usually short, from two to four days. Complaints of dizziness, anorexia, headache, and constipation were present in varying combinations. Vomiting and cramps were prominent symptoms; cramps usually preceded the vomiting. Most of these cases had no history of diminished sweating or of increased frequency of urination. On admission the patients looked exhausted, anxious, and ill. They were pale and sweating profusely, with a cool skin. They showed the classical signs of dehydration.

The average rectal temperature was 100.6° F. The average pulse rate on admission was 90; in 35 per cent the pulse volume was poor. In patients lying down, the systolic pressure was occasionally low, but the diastolic pressure in most cases was higher than in the controls.

In the first twenty-four hours after admission, the patients passed relatively little urine, and this was heavily pigmented; the specific gravity was often over 1,020. Intravenous administration of saline solution and fluids given by mouth increased the urine volumes. A raised hemoglobin and plasma-protein content indicated hemoconcentration. The chloride content of the whole blood and that of the plasma were both grossly diminished; the drop in chloride of the whole blood was more marked than that in chloride of the plasma. The blood urea was raised in all cases.

In all cases, liberal fluids by mouth were ordered. Some patients were given extra salt by mouth in daily doses of 1 ounce. Those who were dehydrated or could not retain fluids, received intravenous saline solution, usually from 4 to 5 pints in three hours. Most of the patients responded rapidly to treatment.

The evidence points to a salt deficiency dehydration as the cause of type 1 heat exhaustion. This develops when sweating rates are high in individuals who habitually excrete an unusually high concentration of chloride in their sweat. It can be prevented by drinking enough to keep the urine output at least at 30 ounces a day and by the administration of 48 gm. of sodium chloride daily. The personnel should be weighed at regular intervals during the hot weather, and any man who shows a persistent loss of body weight should be instructed to drink more water and take more salt.

HAROLD C. OCHSNER, M.D.

Elkinton, J. R., and Winkler, A. W.: Physiological Effects of Drinking Undiluted Sea Water. *War Med.*, Chic., 1944, 6: 241.

Recent clinical and experimental observations indicating the cause of the deleterious effects of drinking undiluted sea water are presented. In composition, sea water closely resembles vertebrate extracellular fluid except that its total ionic concentration is about four times as great. In view of the fact that indefinitely large amounts of sea water can be ingested, if sufficiently diluted with fresh water, it would appear that the deleterious effects of drinking undiluted sea water are related to its hypertonicity. Since the highest recorded concentration of sodium as sodium chloride in human urine does not exceed 1.9 per cent, the ingestion of undiluted sea water presents a dilemma to the organism. Either some of the ingested sodium chloride must fail of excretion, or body water must be sacrificed to eliminate the salt. Magnesium and sulfate require even more water per mol for their excretion than sodium chloride, since the former ions are excreted in isotonic concentration by the intestine.

The actual response of the organism to drinking undiluted sea water will depend on many factors, including the state of hydration of the body and the rate of ingestion of the sea water. In any event hypertonicity of the body fluids must result. The character of the hypertonicity, however, depends on whether or not salt is retained. With no retention of sodium chloride, loss of fluid is distributed over both extracellular and intracellular compartments in proportion to their initial magnitudes. On the other hand, any retained sodium or chloride is confined to the extracellular phase of the tissues, with a resultant osmotic shift of water from the cells to the extracellular fluid.

Experiments done on human subjects are necessarily confined to the early stages of the effects of ingestion of hypertonic saline solution. The later and more severe physiological effects were studied in dogs. Both acute and chronic experiments were included. Since dogs can produce urine that is more concentrated than that of human beings, it was necessary to give the dogs a 5 per cent saline solution, as compared to a 3.5 per cent solution for human beings, in order to produce an analagous condition. The experiments illustrate clearly an important difference between the earlier and later distribution of the dehydration which results from the persistent ingestion of hypertonic saline solution. Complete excretion of salt may be attained at first with presumably the same proportion of depletion for both the extracellular and intracellular phases. As dehydration progresses, body water is not so readily sacrificed, and some sodium chloride is retained, which results in excessive depletion of the intracellular fluid

to maintain the extracellular concentration. The extracellular volume was fairly well maintained in spite of progressive total dehydration. The urinary concentration of salt gradually rose but did not reach the level of the concentration of salt in the solution ingested. Shortly before their death the animals exhibited various disturbances of the central nervous system, including tremors, hyperactive reflexes, motor inco-ordination, and, finally, irregular and failing respiration. The circulation in the meanwhile continued to function well. There was no collapse of the plasma volume; renal excretion remained active; the pulse was vigorous; and the electrocardiograms were normal. The terminal event was respiratory failure, and the picture was clearly not one of circulatory failure.

From a practical standpoint there would appear to be no advantage to castaways in the drinking of diluted sea water instead of ingesting the diluent alone. With respect to the suggestion that water requirements might be met, as in seals, by the ingestion of fluids from the flesh of fish, the authors state that this is reasonable from the standpoint of salt excretion, but it ignores the fact that much urea, requiring water for its excretion, is formed from the protein which is in the fish.

JOHN L. LINDQUIST, M.D.

Aitken, R.: The Prophylaxis of Cutaneous Cancer. *Edinburgh M. J.*, 1944, 51: 339.

Cancer is a disease which is increasing in importance in view of the amount of attention which has been directed to it and the misery and suffering which it brings so often in its train. It has frequently been asserted that the incidence of cancer is greater than formerly. This view, however, has been questioned, those who oppose it maintaining that the increase is to a large extent due to the fact that it is readily recognized now whereas formerly it escaped observation. It is interesting in this connection to study the figures of cancer as seen in the Skin Department of the Royal Infirmary in relation to the number of out-patients attending.

These figures show that the percentage increase of cancer of the skin in recent years is negligible. There has been rather more than a 40 per cent increase in the number of new patients attending the Skin Department during the last ten years, while the increase in the cases of skin cancer has been 0.11 per cent.

One point has to be kept in mind in studying these figures. In the author's opinion more cases of rodent ulcer at an early stage are being sent up to the Skin Department than formerly, it being not uncommon now for rodents the size of a lentil or less to be referred for treatment.

Another point to be noted is the small number of cases of squamous-cell cancer. An average of just over 3 per annum has been seen against an average of 90 rodents. Thus the squamous-cell carcinoma forms a very small percentage of the total cancer cases.

It might be thought that the skin is an excellent organ for studying the problem of cancer, and in some respects this is true. We are, however, faced with the difficulty that we know so little of the cause of cancer of the skin. It is true that certain substances are prone to produce cancer, but that does not take us far. These carcinogenic substances, as they are called, produce only one type of cancer and that is the less common, squamous-cell, variety. No such substances can be blamed for producing the rodent-ulcer type, which, as is seen from the figures given, is much the more common. About the cause of this type we must confess ignorance, and so no prophylactic measures can be taken. The relationship of injury to cancer is not clear. This is true of cancer of the skin as well as of cancer of other organs. It is unusual to obtain any history of injury in cases of rodent ulcer.

The substances which produce cancer are many and varied. Most of these are external irritants, but there is one drug which, when taken internally over a prolonged period, tends to give rise to squamous epithelioma. This drug is arsenic. Prolonged ingestion of arsenic gives rise to hyperkeratosis of the palms and soles, and eventually some of these hyperkeratotic areas become malignant.

Many physical and chemical agents produce cancer of the skin. The most notable are light, heat, and x-rays among the physical, and soot, tar, pitch, anthracene, and paraffin among the chemical. It is probable that a particular type of skin, inherited or acquired, is necessary for the development of cancer, as it is only a small proportion of persons coming in contact with these substances who develop the cancerous condition.

Most of the other substances which ordinarily produce carcinoma are met with in the course of working with them, the condition thus becoming an occupational hazard. Soot is known to be provocative of cancer, and it was the first product of coal distillation known to produce injury. Potts described chimney-sweeps' cancer, which occurs on the scrotum, and it is curious that this form of the disease seems to occur, according to Pusey, only in England.

Tar and pitch are other substances which produce skin cancer. According to Prosser White, lignite, gas-works tar, producer-gas tar, and coke-oven tar will give rise to epithelioma, while blast-furnace tar does not, either in men or mice. It would seem that it is the fractions which distill at a high temperature which cause epithelioma, and the critical temperature seems to be about 350° C. In the Skin Department many patients are treated each year with crude coal tar and there has not been a case recorded in which the patient developed cancer as the result. Not one of the cases of squamous-cell carcinoma occurring in the ten-year period mentioned earlier had had any tar treatment, nor, so far as the author is aware, has any of the numerous patients who received treatment with crude-coal tar ever developed carcinoma of the skin as a result.

Another industry in which cancer has been common is the cotton industry. Here the mule-spinners are those chiefly affected. It may occur on the arms, but the scrotum is the place usually associated with epithelioma in this industry. The oil from the spindles is thrown out as they rapidly rotate and the workmen's clothing becomes saturated with it. Friction of the scrotum against the mule frame as the worker leans forward is the other factor concerned. Women who work in this department are not affected.

About 70 per cent of all cancers seen in mule-spinners are on the scrotum. It is strange, but it would appear that no cases of this particular cancer have been reported in France, Germany, Russia, or Poland, while it seems to be rare in the United States.

The true paraffin cancer arises in workers in the paraffin department of the shale oil industry. Various earlier lesions occur, sometimes within a few weeks after the worker is employed in this department.

The lesions disappear in a short time if the employee ceases to work with paraffin, but they persist in greater or lesser degree as long as the men continue to work in the department. The early lesions may be comedones, but much more common is an inflammation of the mouths of the follicles. This is the characteristic shagreen skin which occurs not only in paraffin workers but also in mule-spinners, and the author has also seen it in a worker in a ropery where mineral oil was used. One other feature completes the picture and that is the presence of warty lesions. The important point about this lesion is that it may develop many years after the worker has ceased to be employed in the paraffin department. These warts are the precursors of carcinoma, though it may also arise from indurated papules.

With regard to the actual cause of the carcinoma it is definitely established that it consists in the contact with the oily paraffin scale as the scale itself has been proved not to be the cause. The oil is the agent which provokes the changes in the skin which eventually lead to the cancer.

The prophylactic measures adopted at the Scottish Oil Works have been efficient and successful. Each man has a bath after quitting his work. Soiled working clothes are put into lockers which are heated, and are thus dry before the men resume work next day. A rigorous selection of the men employed in the paraffin department is made, all showing an early tendency to paraffin eruptions being removed and sent to other departments.

What has been done in this industry may be done in others. Admittedly, the number of men employed in the paraffin department of Scottish Oils is not large, but mere numbers should not be allowed to stand in the way of measures designed to prevent such a serious industrial hazard. The willing cooperation of employers, employees, and medical men is essential to the success of such a scheme.

JOHN E. KIRKPATRICK, M.D.

Butler, A. M., and Talbot, N. B.: Medical Progress; Parenteral-Fluid Therapy. Estimation and Provision of Daily Maintenance Requirements. *N. England J. M.*, 1944, 231: 585.

The last fifty years have witnessed a steady increase in knowledge concerning the metabolic disturbances resulting from starvation and dehydration. In addition, the increased availability of specific nutrients, and of solutions through parenteral administration has increased not only the possible effectiveness of parenteral nutrition and repair therapy but also the physician's responsibility in the parenteral administration of fluids. This review presents in outline form such basic data as may be helpful in effectively utilizing this knowledge in the parenteral therapy that is at hand today or may become available tomorrow.

Tables 1, 2, and 3 best present these basic facts:

As to the manner and rate of parenteral administration, the authors state that since information regarding many factors concerned with optimal utilization of such nutrients is lacking, the prescription of the rate of infusion and composition of parenteral fluids for a given patient must reflect common sense,

TABLE 1.—APPROXIMATE NORMAL SODIUM CHLORIDE MAINTENANCE ALLOWANCES PER DAY FOR RESTING NONSWEATING PERSONS OF VARYING SIZE

Size	Sodium Chloride	Physiological Saline Solution
	gm.	cc.
Infants	1	125
Children	3	350
Adolescents and adults.....	6	700

TABLE 2.—APPROXIMATE DAILY CALORIC REQUIREMENTS OF NORMAL RESTING PERSONS OF VARYING SIZE, TOGETHER WITH THE DAILY DEXTROSE AND AMINO ACID ALLOWANCES* THAT THEORETICALLY MIGHT SATISFY THEM

Size	Daily Caloric Requirement	Daily Dextrose Allowance		Daily Amino Acid Allowance	
	cal./kgm.	gm./kgm.	cal./kgm.	gm./kgm.	cal./kgm.
Young infants	60	14	54	1.5	6
Old infants	55	13	51	1.0	4
Children	30	7	28	0.6	2
Adolescents and adults	25	6	24	0.6	2

*Available evidence suggests 6 gr. of amino acid as a reasonable daily allowance for the adult; that for estimating the daily allowances for young resting patients on a high carbohydrate diet is meager.

TABLE 3.—APPROXIMATE NORMAL WATER LOSSES AND ALLOWANCES* PER DAY FOR PERSONS OF VARYING SIZE NOT SUBJECT TO EXERTION OR SWEATING

Size	Water Loss				Usual Water Allowances		
	Urine	Stool	Insensible	Total			
	cc.	cc.	cc.	cc.	cc./person	cc./kgm.	oz./lb.
Infant (2 to 10 kgm.)	200–500	25–40	75–300†	300–840	330–1000	165–100	2.5–1.5
Child (10 to 40 kgm.)	500–800	40–100	300–600	840–1500	1000–1800	100–45	1.5–0.7
Adolescent or adult (60 kgm.)	800–1000	100	600–1000‡	1500–2100	1800–2500	45–30	0.7–0.5

*Including the water content and water of oxidation of food, which under normal circumstances, except for infants, approximates the insensible water loss.
†1.3 cc. per kilogram per hour.
‡0.5 cc. per kilogram per hour.

careful clinical observation, and a "tolerance indicative of an enlightened awareness of ignorance."

J. M. MORA, M.D.

DUCTLESS GLANDS

Finkler, R. S., Furst, N. J., and Klein, M.: A Clinical and Roentgenological Study of the Effects of Hormonal Therapy on Bone Growth. *Radiology*, 1944, 43: 346.

Observations on the rate of bone growth were made not only on children treated for growth deficiency, but also on those showing hypogenitalism, cryptorchidism, pseudo-Froehlich's syndrome, obesity, and mental retardation. Clinical observations of growth and of genital and somatic development were recorded. Prior to, during, and after therapy, routine roentgen studies of the skull, sella turcica, and long bones were made at regular intervals. The skeletal age was estimated by the epiphyseal development of the distal ends of the radius, ulna, metacarpals, and the phalanges of the hands, by the presence of the centers of ossification, and the number of carpal bones. The progress of skeletal development was judged in accordance with the standards of Todd. The degree of mineralization was estimated by the standards established for the study of osseous structures.

These studies were carried out on a group of 81 children, of whom 65 were clinic patients and 16, private patients. The therapeutic agents employed were: thyroid substances (in 18 children), extract of the anterior lobe of the pituitary gland (in 26 children), chorionic gonadotropin (in 19 children), and male sex hormone (in 18 children). The effect of the various hormones on skeletal growth, bone density, and epiphyseal union was noted.

Before hormonal therapy all of the children presented various psychological maladjustments; most of them were shy, selfconscious, and unsociable; others were resentful toward their parents, guardians, or society in general. Following successful endocrine therapy, with improvement in growth and genital and muscular development, there was a tendency to improvement in mental and emotional stability.

EMIL C. ROBITSHEK, M.D.

Clute, H. M., and Williams, R. H.: Thiouracil in the Preparation of Thyrotoxic Patients for Surgery. *Ann. Surg.*, 1944, 120: 504.

The authors report their experience with thiouracil in 115 thyrotoxic patients, 81 of whom were treated without surgery; the remaining 34 were treated with thiouracil and surgery. The medically treated patients experienced, for the most part, an early return to normal without further toxic manifestations, unless iodine had been taken for a long time previously.

Of the 34 surgical patients, 4 had toxic adenomatous goiter; the others had typical uncomplicated exophthalmic goiter. Surgical patients were treated for five weeks preceding thyroidectomy, were usually operated upon after two days of hospitalization, and returned home six or seven days after operation.

Certain patients, perhaps 10 per cent, have complications from thiouracil of sufficient degree to necessitate discontinuation of the drug. The most serious complications are agranulocytosis, leucopenia, morbilliform rash with itching, and nausea and vomiting.

During the period of preoperative preparation, usually, the thyroid gland became smaller and firmer. The active pulsations, thrills, and bruits tended to disappear. In some cases, however, the goiter seemed to become larger as treatment progressed, but this was unusual. In most patients having a stare and a widened palpebral fissure, improvement in the eyes occurred as their general condition improved. In individuals showing manifestations of malignant exophthalmos, apparently the minimal effective dose of thiouracil should be used to bring the metabolism to normal. Overtreatment may lead to an increase in the exophthalmos.

At the time of operation the thyroid gland in thiouracil-treated patients is firm and resembles the consistency of the untreated hyperplastic thyroid; it is not as vascular as in untreated patients, although the superior and inferior arteries are still of large caliber. The tissue surrounding the gland is at times densely adherent to it and cleavage planes are hard to establish. More bleeding is encountered in some of the thiouracil-treated patients than in the iodine-treated patients.

Histologically, the thiouracil-treated hyperplastic gland showed very little colloid. The cells of the acini were tall and columnar. Many of the acini were small and contracted, only a few showing papillary projections. There seemed to be an increase in interstitial tissue between the acini. There was little histological difference between the glands of patients treated only a few weeks and the glands of patients treated over a period of many months. In patients who received both iodine and thiouracil there were definite increases in the colloid contents of the acini as compared to the findings in patients who had received no iodine.

The operative course in thyrotoxic patients treated for five or six weeks with thiouracil is characterized by its smoothness. Like patients with a normal metabolism, these patients react to a moderate surgical procedure, with no outstanding changes in the pulse or blood pressure, and with a postoperative course that is smooth and uneventful. The nervousness, activation, and severe tachycardia were entirely absent in the authors' cases. The induction and maintenance of anesthesia are the same as in any patient with a normal metabolism. Cyclopropane-oxygen has been the anesthetic of choice in all of the authors' patients.

STEPHEN A. ZIEMAN, M.D.

SURGICAL PATHOLOGY AND DIAGNOSIS

Willis, R. A.: The Mode of Origin of Tumors. Solitary Localized Squamous-Cell Growths of the Skin. *Cancer Res.*, 1944, 4: 630.

The most prevalent view concerning the mode of origin of tumors is that each tumor has a simple unicentric origin, arising at a single point in time from a single small focus of cells, and that it enlarges only by multiplication of these cells and their descendants.

To test this theory, the author studied the structure of 10 early, localized, solitary, squamous-cell carcinomas of human skin, and came to the conclusion that the structure of these growths was incompatible with a strict unicentric view regarding their origin, and that, instead, the structure showed that each has arisen by spreading cancerization of a field of epidermis.

The precancerous state of an area of skin includes significant dermal changes, especially in the subepithelial elastic tissue; and invasion of the dermis by the cancerous epithelium probably commences at points of greatest damage to the dermal elastica.

Progressive neoplasia in a field of tissue does not imply the passage of any carcinogenic stimulus from cell to cell, but is merely the progressive response of an area of epithelium to the same original stimuli, the timing and distribution of this progressive response depending on the distribution and intensity gradients of the causative stimuli.

The author believes that the evidence advanced justifies the view that squamous-cell carcinomas of the human skin are comparable with those produced experimentally, and that they are the products of the following sequence of events:

1. A skin field, more or less extensive, has been subjected to a succession of carcinogenic stimuli (still often unspecifiable in human beings), which have induced slow progressive changes in both the epidermis and dermis of that field and are structurally apparent as precancerous hyperplasia.

2. At the central focus (or at several high potential foci) of the field, hyperplasia passes into irreversible neoplasia, with or without immediate invasion of the dermis by the epithelium.

3. As cancerous proliferation and invasion progress at the central part of the field, cancerous change of the surrounding unstable epidermis takes place in a steadily enlarging area around the center.

4. After the entire field of the predisposed epithelium has become cancerous the tumor enlarges solely by proliferation of the cancerous cells, and structural evidence of its mode of origin is soon lost.

The author strongly emphasizes the point that a skin cancer in its early formative stage arises more by a gradual transformation of pre-existing epidermis than by cellular multiplication, and that only after the formative field has all suffered neoplastic change does the tumor grow solely by multiplication.

JOSEPH K. NARAT, M.D

Berenblum, I.: Irritation and Carcinogenesis. *Arch. Path.*, Chic., 1944, 38: 233.

In this review the author carefully defines his terms and poses a series of questions which he answers by logical reasoning and by known clinical and experimental evidence in an attempt to arrive at the relationship between irritation and carcinogenesis.

The first question presents the problem in its crudest form: Are all irritants potentially carcinogenic? An affirmative answer would mean that irritation plays an essential part in the production of tumors, while an answer in the negative would mean that irritation is not by itself responsible for tumor formation although it might play a vital part in carcinogenesis. With certain physical agents designated by the term "radiation," including roentgen rays, gamma rays, and ultraviolet rays, there is an apparent correlation between their power of producing injury to tissue and their ability to induce tumors. Of many chemical irritants tested only a small proportion have been found to possess carcinogenic action. Trauma in the sense of one or a few mechanical injuries cannot be accepted as an important or frequent cause of tumor formation in view of the extreme frequency of traumatization and the extreme rarity of tumors of "proved traumatic origin." In regard to a relationship between long-continued friction and tumor formation, the operation of other factors sometimes makes the answer difficult, but chronic mechanical irritation (friction) cannot be accepted as a common or even likely cause of tumor formation. The relation of thermal injuries to carcinogenesis is complicated by the fact that they do not represent a single entity, but the available

evidence is more convincing than that concerning mechanical injuries. Both burns and repeated freezing have been demonstrated to be carcinogenic. Other experiments do not support the view that irritation itself is a deciding factor in carcinogenesis and, thus, the answer to the question, "Are all irritants potentially carcinogenic?" is emphatically "No."

The second question is: "Are all carcinogenic agents irritants?" This question requires a definition of what is meant by "irritant." If by "irritation" is meant the production of a continued state of reparative hyperplasia, which is the meaning as defined in this review, then all the direct carcinogens, without exception, are irritants. One is thus brought back to the central problem of hyperplasia. What does it represent? How does it differ from neoplasia? And what evidence is there that preneoplastic hyperplasia is biologically different from reparative hyperplasia? Hyperplasia and neoplasia are both cellular proliferation in excess of the normal. The distinction lies in the extent or limit of growth. Knowledge of the development of occupational tumors in man and experimentally induced tumors in animals points to the occurrence of a "preneoplastic hyperplasia" preceding the development of a tumor. The conclusion already reached that all direct carcinogens are irritants means when translated into terms of response that all tumor-producing agents are also hyperplasia-producing agents. These facts taken together indicate that hyperplasia is an invariable and essential preliminary to neoplasia. But it has already been shown that not all irritants are carcinogenic. Therefore, preneoplastic hyperplasia must be a special kind of hyperplasia, biologically distinguishable from ordinary reparative hyperplasia. Further, the experimental evidence that preneoplastic hyperplasia is of a specific type is convincing.

It is conceivable that the development of a tumor out of normal tissue could be a sudden change or it could be dependent on a sequence of separate specific biological reactions. In the neoplastic transformation of the skin of the mouse or rabbit following application of a carcinogen, three distinct phases can be recognized: (1) the prewart stage during which hyperplasia is the dominant lesion; (2) the stage of benign tumor growth, during which one or more papillomatous structures appear and grow; and (3) the stage of cancer, when one of the latter structures starts to infiltrate the subepithelial tissues. The question arises as to whether the three phases are consecutive stages of a single carcinogenic process, or are they consecutive but separate processes? Several methods of approach have been used in an attempt to answer this question. The balance of evidence is in favor of the view that prior to the establishment of cancer, continued stimulation enhances the carcinogenic process. The experimental data are tabulated in three groups of results: (1) the irritant and the carcinogen are applied concurrently; (2) the irritant is applied for a period preceding the application of the carcinogen; and (3) the irritant is applied after the application of the carcinogen has been discontinued.

The effect of applying another irritant concurrently with a carcinogen varies according to the irritant used, but most irritants seem to have no significant influence when applied in this way. This is further evidence that intensity of irritation is not the deciding factor in carcinogenesis. These experiments bring to light the existence of specific cocarcinogenic agents and equally specific anticarcinogenic agents. More precise information is derived from experiments in which the application of the irritant either precedes or follows the treatment with carcinogen. Ordinary irritants generally prove unsuccessful in producing a preneoplastic lesion of the skin, but many of them seem able to precipitate a tumor once the preneoplastic state has been established. The balance of evidence is therefore strongly in favor of the view that the component phases of carcinogenesis are consecutive but independent processes.

Thus the evidence indicates that preneoplastic hyperplasia is a highly specific type of hyperplasia, since only carcinogenic agents can produce it with certainty, but that once the preneoplastic stage has been induced by a true carcinogen a benign tumor can be made to appear at that site, and a tumor already present can have its progress to carcinoma hastened by the action of a variety of noncarcinogenic irritants. If this is confirmed, the following practical lessons will have been learned: (a) there is little danger that an ordinary irritant will produce a tumor of its own accord; (b) this applies also to the initiation of a preneoplastic lesion; and (c) given a preneoplastic lesion, the subsequent development of a benign tumor at the site may be facilitated, and its progress to cancer hastened, by the action of a variety of nonspecific irritants. With most nonspecific irritants this facilitation is far less effective than it is with a true carcinogen.

JOHN L. LINDQUIST, M.D.

EXPERIMENTAL SURGERY

Moyer, C. A., Coller, F. A., Iob, V., Vaughan, H. H., and Marty, D.: A Study of the Interrelationship of Salt Solutions, Serum, and Defibrinated Blood in the Treatment of Severely Scalded, Anesthetized Dogs. *Ann. Surg.*, 1944, 120: 367.

Saline-bicarbonate solution is more effective than Ringer's-lactate solution, and Ringer's-lactate solution is more effective than "isotonic" sodium-chloride solution in prolonging the life of anesthetized dogs when an amount of these solutions equal to 10 per cent of the animals' body weight is given intravenously before the animals are scalded (two-thirds body surface at 85°C. for thirty seconds). The presence of the bicarbonate ion or the potential bicarbonate ion in the lactate solution appears to be responsible for the superiority of the Ringer's-lactate and the saline-bicarbonate solutions.

The combination of massive transfusions of defibrinated blood and oral administration of saline-

bicarbonate solution was the only form of therapy employed that prevented shock without inducing complications that were incompatible with life.

The other forms of therapy employed, namely, (1) saline-bicarbonate, (intravenous); (2) saline-bicarbonate (intravenous), and serum (intravenous); (3) serum (intravenous) and saline-bicarbonate by stomach; and (4) defibrinated blood (intravenous) and water ad libitum, prolonged life and in a number of instances prevented shock. However, all of the animals that did not die of shock during the first twenty-four hours died later of complications that seemed to be related to the therapy rather than to the trauma.

A hematocrit of from 80 to 85 per cent does not prohibit the use of transfusions of whole blood.

JOHN J. MALONEY, M.D.

Elman, R.: The Influence of Ether, Morphine, and Nembutal on the Mortality in Experimental Burns. *Ann. Surg.*, 1944, 120: 211.

Experiments show that the early mortality following severe thermal injury is profoundly influenced by the type of sedation and anesthesia used. A series of experiments were carried out in which severe burn stimulus (immersion up to the axilla at 100° C. for ten seconds) was employed in a series of 10 experiments each; various doses of morphine in combination with nembutal or ether were used in each group.

Morphine increases the twenty-four hour mortality (up to 100 per cent) in severe experimental burns, particularly when given in large doses and with nembutal. Practically no twenty-four hour mortality occurred when ether alone was employed. It is inferred that large doses of morphine, when used in the absence of pain, may increase the early mortality in severe human burns. LOUIS T. BYARS, M.D.

HOSPITALS; MEDICAL EDUCATION AND HISTORY

Adams, J. M.: Stanocola Medical Care Plan. *J. Am. M. Ass.*, 1944, 126: 333.

The features of the Stanocola Medical and Hospital Association are as follows:

1. It was conceived and organized, and is owned, supported, and operated by employees.
2. Membership is entirely voluntary.
3. It supplies necessary medical, hospital, and nursing services to employee members and to their families.
4. There is only one rate of dues, regardless of the number of dependents.
5. The medical staff is on salary and mainly on full time.

Although it is owned and operated by the employees, the company is much interested in its success and lends its support by:

1. Making payroll deduction of the dues.
2. Permitting deduction of the dues from the company thrift fund. This fund is supported by regular, voluntary contributions by employees and by the company. Dues collected from this fund, as 85 per cent of them are, represent both employee and company contributions. Through the medium of this fund, members of the association thus receive material help from the company in the payment of their dues.
3. The company has aided the association substantially by making a large donation toward the purchase of its clinic building, and on other occasions has made contributions for special purposes.
4. The board of directors of the association has always included two or more of the company's executives, elected by the membership. The association is entirely distinct from the company's medical department, whose work is limited to industrial medicine—preventive medicine and the care of industrial injuries and diseases.

This plan was put into effect in April, 1924, as a result of the reduction of income on the part of the employees of the company, who had been unable to secure a reduction in prices and fees to equalize their loss of income. At this time the project was placed on an experimental basis since there were then no Blue Cross hospital plans. The first arrangement was one in which 1,300 employees made an agreement with 4 physicians to pay a retainer of one dollar annually per membership. The physicians divided this fund and agreed to treat the subscribers for one-half of the usual fees. This arrangement was unsuccessful and therefore was not renewed after one year.

The Stanacola Medical and Hospital Association was then formed with 2,200 subscribers. In the beginning, arrangements were made with private practitioners to treat those eligible in the doctors' own offices. In the panel were a surgeon, who served as medical director, and an ear, nose, and throat specialist. After six months of operation clinic space was rented and all of the physicians except the surgeon were placed on full time. Three years later the surgeon and medical director were included on this basis. In 1931 larger quarters were obtained and the staff increased to 11 doctors on full time and 5 on part time. In addition to the medical staff, 6 nurses, 2 laboratory technicians, an x-ray technician, 2 office girls, and a cleaning staff were employed, and a couple living in the garage answered telephone calls when the offices were closed. The character of the medical staff is excellent, all members being graduates of approved medical schools and most of them having had postgraduate training.

Aid provided starts with medical and surgical services limited only by the capacity of the staff. Patients are treated in the clinic, in the hospitals, or in their homes within a radius of seven miles of the clinic, as indicated. Beyond the 7-mile limit a small mileage fee is paid by the patient to the doctor. Hospitalization is at ward rates except that private rooms are provided for contagious diseases and when privacy is a necessary part of the treatment. The general hospitals in Baton Rouge are used and

accord special rates to the association. Special nurses are provided when they are considered necessary. Hospitalization and nursing costs are limited to $250 for each case.

The average cost to each member of the Association per month is $3.50.

The advantages to the members are as follows:

1. The members of the association have adequate medical, hospital, and nursing care for themselves and for their families at a predetermined cost. The total cost is probably as great as if the group purchased the service individually, but it has probably received more service than it would have purchased as individuals.

2. The members have been supplied with services at least the equal in quality of that otherwise available, and superior to that usually received by persons in the same economic group. They have had the advantage of much freer consultation with specialists than they would have had otherwise, and laboratory and x-ray examinations are more freely used.

3. They have escaped a not infrequent cause for strangling debt—large medical and hospital bills.

4. They have the satisfaction of providing this care for themselves and their families by their own efforts rather than having it handed to them.

The advantages to the employer are as follows:

1. Adequate medical care for the employee is provided with return to duty with the minimum loss of time.

2. Close co-operation exists between the company's medical department and the employee's physician.

3. It is easier to persuade employees to have physical defects corrected than it would be otherwise.

4. Fraudulent claims of industrial injury are reduced.

5. The morale of the employees is improved by freedom from worry over costs of illness and by the satisfaction of providing such excellent medical care through their own efforts.

The advantages to the medical staff of the association are:

1. The compensation is probably higher than the average in the community in normal times.

2. The inconvenience of carrying on an individual business is avoided.

3. Each physician has one day off each week and an annual vacation with pay.

4. Postgraduate training at the expense of the association is provided on occasions.

5. The close association and consultation with other physicians stimulates them to better work.

BENJAMIN GOLDMAN, M.D.